

### 5.1.3 Revision 1, Revised Proposed Action – April 2010

Consistent with Tiers 1 and 2 of the USFWS Wind Energy Guidelines and Tier 1 of the WGFC Wind Energy Recommendations, following the submittal of the Original Proposed Action, PCW conducted a broad, landscape-scale evaluation of the Application Area using the results of the 2008-2009 baseline wildlife surveys. *See Section 4.1.* This included an evaluation of the locations of multiple resources including raptor nest locations and habitat for avian and other wildlife species. The evaluation also included identification of preliminary environmental constraints based on the RMP for the BLM RFO and the best available environmental information and datasets for the Ranch.

As a result of the initial avoidance and minimization effort associated with PCW's review of the Original Proposed Action, over 30% of the wind turbine locations in the Original Proposed Action (approximately 340 wind turbine locations) were removed from consideration. This included proposed wind turbine locations in the southernmost portion of Sierra Madre and the western portion of Upper Miller Hill (also in Sierra Madre). Accordingly, PCW amended its Type-II Wind Energy Project Area Grants to add potential development areas in Sierra Madre (Lower Miller Hill, Sage Creek Basin, and Sage Creek Rim). The Application Area along with these expanded areas form the Amended Application Area evaluated by BLM in its FEIS (with a few additional minor adjustments). The Amended Application Area encompasses approximately 216,000 acres, including all of Phase I.

Following amendment of its Type-II Wind Energy Project Area Grants, PCW revised its Original Proposed Action (the Revised Proposed Action). The Revised Proposed Action moved proposed wind turbine locations from the southernmost portion of Sierra Madre and the western portion of Upper Miller Hill to areas in Lower Miller Hill, Sage Creek Basin, and Sage Creek Rim. When compared with the Original Proposed Action, these wind turbine relocations resulted in decreased impacts to multiple resources, including areas of high quality sagebrush habitat, aspen/mixed conifer woodlands, and mountain shrub communities. The reduction of impacts in these areas benefits sagebrush obligate species as well as raptors and other migratory bird and bat species of concern. The Revised Proposed Action was provided to BLM in April 2010. *See Figure 5.3.*

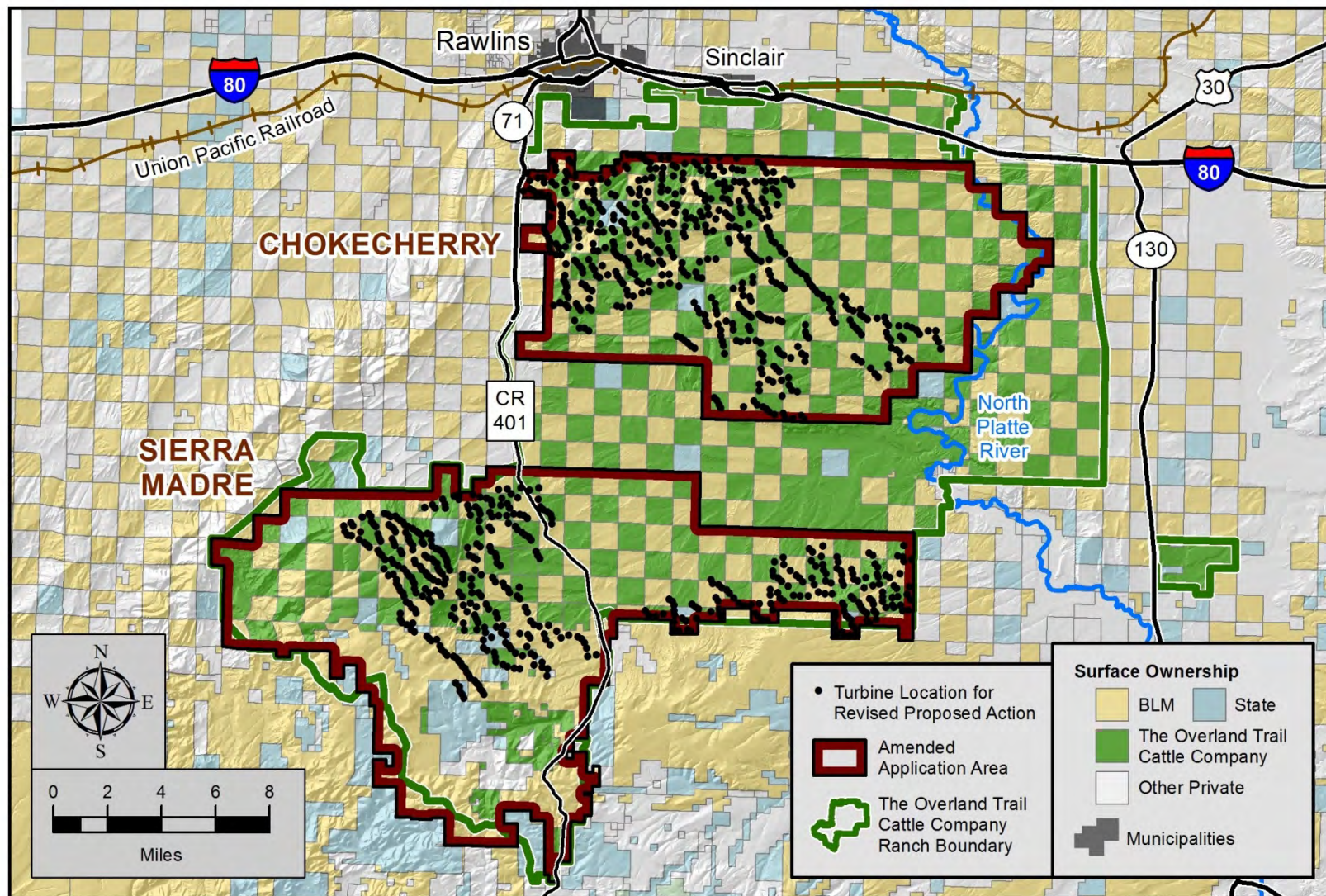


Figure 5.3. Revision 1: Revised Proposed Action – April 2010.

#### **5.1.4 Revision 2, Applicant Proposed Alternative – August 2010**

In August 2010, PCW again revised the CCSM Project by removing all wind energy development from greater sage-grouse Core Areas as designated in the Wyoming Governor's Executive Order 2010-4 (and subsequently Executive Order 2011-5). The State of Wyoming Core Area conservation strategy for greater sage-grouse limits development and disturbance in large areas of public, private, and state land across Wyoming. In the vicinity of the CCSM Project, habitats along and east of the North Platte River and habitats south and west of the Sierra Madre WDA are identified as Core Areas for greater sage-grouse conservation. These areas include high quality sagebrush habitat, aspen/mixed conifer woodlands, and mountain shrub communities. The removal of proposed wind turbine locations in these areas benefits sagebrush obligate species as well as raptors and other migratory bird and bat species of concern.

PCW modified the Revised Proposed Action by relocating 68 wind turbines, primarily from western and southern Upper Miller Hill, where the best wind resources are located, to areas outside of greater sage-grouse Core Areas and the associated high quality sagebrush habitat. This is in addition to the over 300 wind turbines that were relocated between the Original Proposed Action and the Revised Proposed Action, most of which were also originally sited in what are now designated greater sage-grouse Core Areas. Revision 2 to the CCSM Project wind turbine layout was submitted to BLM in August 2010 as the Applicant Proposed Alternative. BLM analyzed the Applicant Proposed Alternative as Alternative 1R in its Draft EIS. *See BLM 2011b. See Figure 5.4.*



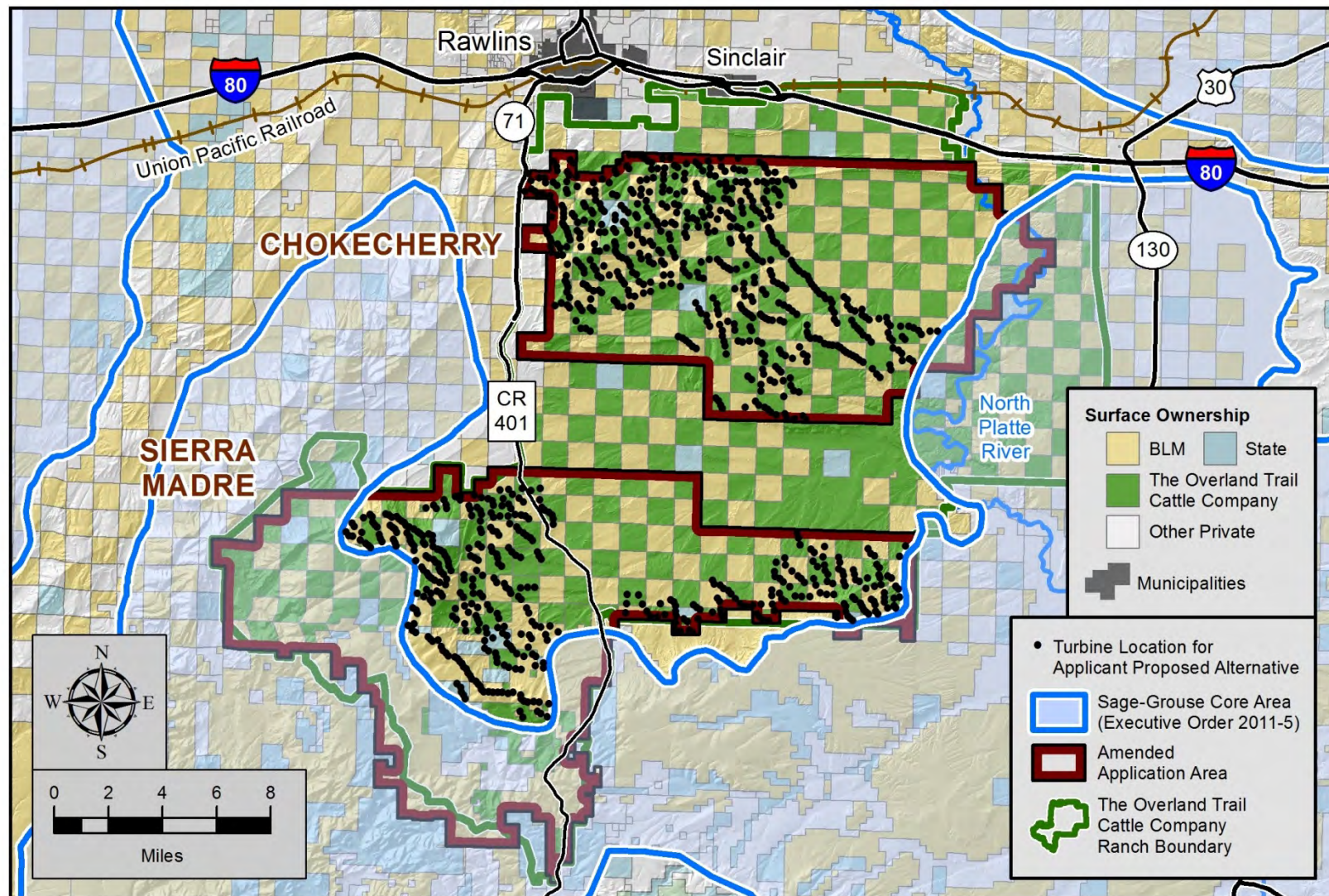


Figure 5.4. Revision 2: Applicant Proposed Alternative – August 2010.



#### **5.1.5 Revision 3, Revised Plan of Development – January 2012**

Following the release of BLM's Draft EIS in July 2011, PCW revised the CCSM Project again in its POD dated January 2012. This revision considered the analysis contained in the BLM Draft EIS and incorporated updated ACMs and a revised wind turbine layout. Many of the ACMs are consistent with conservation practices recommended in the USFWS Wind Energy Guidelines, WGFC Wind Energy Recommendations and other additional recommendations made by USFWS, BLM, and WGFD. Specifically, in the January 2012 POD, PCW worked to further reduce surface disturbance and habitat fragmentation and to provide flight/movement corridors for migratory bird and bat species throughout the CCSM Project by aligning wind turbines into rows. In addition, wind turbines were also removed north of the hogback and south of Rasmussen Reservoir to further reduce potential risk to migratory bird and bat species and other wildlife from the CCSM Project. This revised wind turbine layout formed the basis of BLM's analysis in the FEIS. *See Figure 5.5.*

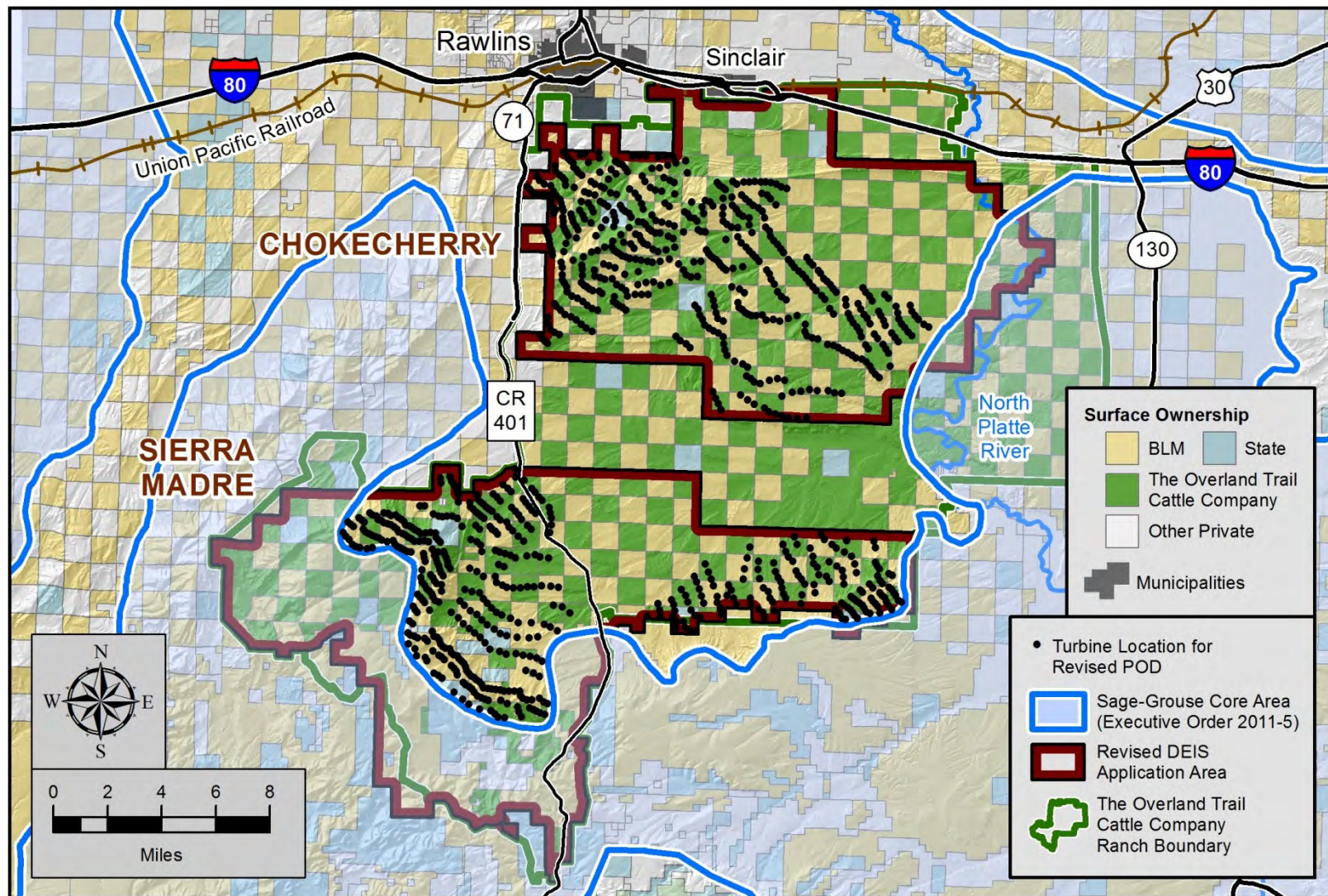


Figure 5.5. Revision 3: Revised Plan of Development – January 2012.



#### **5.1.6 Revision 4, Turbine No-Build Areas – July 2012**

Beginning in 2010, PCW coordinated and consulted with USFWS, BLM, and WGFD to identify additional surveys necessary to identify and document migratory bird and bat use areas, potential migration areas, nesting areas, and other resources associated with migratory bird and bat use of the CCSM Project Site. The purpose of these surveys was to inform additional avoidance and minimization efforts to reduce risks to migratory birds and bats by identifying areas of highest use within the CCSM Project Site. These surveys were conducted between April 2011 and July 2012. *See Section 4.4.*

Based on the site-specific data collected through July 2012 and the recommendations made by USFWS, PCW further revised the wind turbine layout in its January 2012 POD (Revision 4). PCW provided Revision 4, which included Turbine No-Build Areas, to USFWS on July 18, 2012. Revision 4's Turbine No-Build Areas total over 105,000 acres across the Ranch and were designed to reduce impacts to migratory birds and bats by avoiding placement of wind turbines in and adjacent to many of the documented avian use areas, flight/movement corridors, and raptor nesting and foraging habitats. The Turbine No-Build Areas were identified through a kernel density analysis of the long-watch raptor survey data, observed raptor flight paths, incidental observations, and consideration of recommendations from USFWS regarding important avian use areas.

In addition to designating Turbine No-Build Areas, Revision 4 removed wind turbines from the Red Rim-Grizzly WHMA located west and south of the Miller Hill portion of the Sierra Madre WDA. The Red Rim-Grizzly WHMA is managed to benefit wildlife species including migratory birds and bats. According to WGFD, the Red Rim-Grizzly WHMA also provides habitat for migratory birds such as ferruginous hawks, red-tailed hawks, and passerines. *See WGFD 2013.* Survey data demonstrates that locations adjacent to and within the Red Rim-Grizzly WHMA had relatively high raptor use compared to other areas that are currently proposed for the CCSM Project. Removal of wind turbines from the Red Rim-Grizzly WHMA reduces potential impacts to migratory birds and bats and will ensure that the Red Rim-Grizzly WHMA continues to provide important habitat for these species and a conservation benefit to local and regional migratory bird and bat populations.

Approximately 66 wind turbines were moved in Revision 4 such that no wind turbines will be constructed in or overhang the boundaries of the Turbine No-Build Areas. Revision 4 of the CCSM Project wind turbine layout, referred to as the Turbine No-Build Areas layout, formed the foundation for the further avoidance and minimization discussions between PCW and USFWS, BLM, and WGFD. The designated Turbine No-Build Areas are described in additional detail below. *See Figure 5.6 & Figure 5.7.*

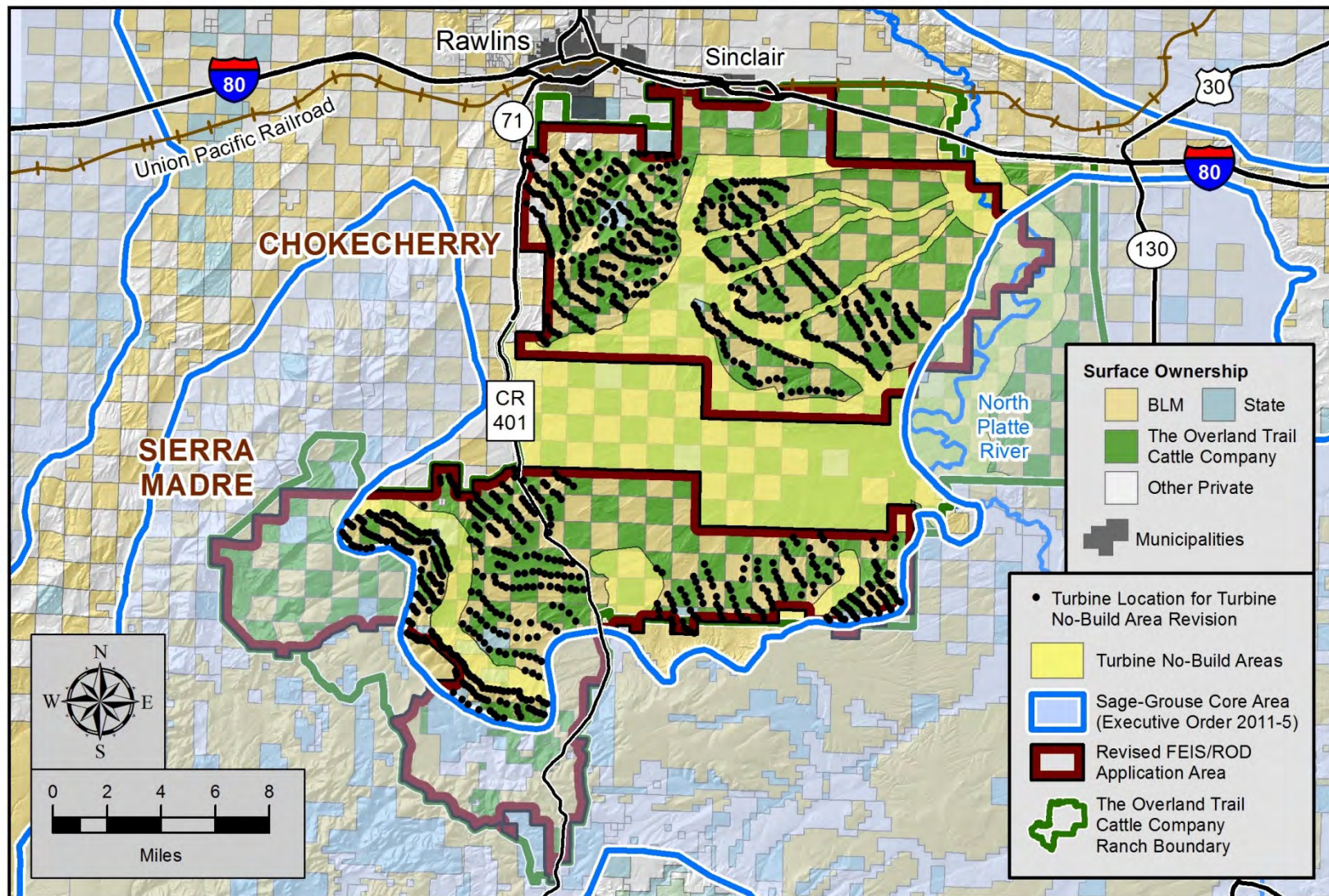


Figure 5.6. Revision 4: Turbine No-Build Areas – July 2012.



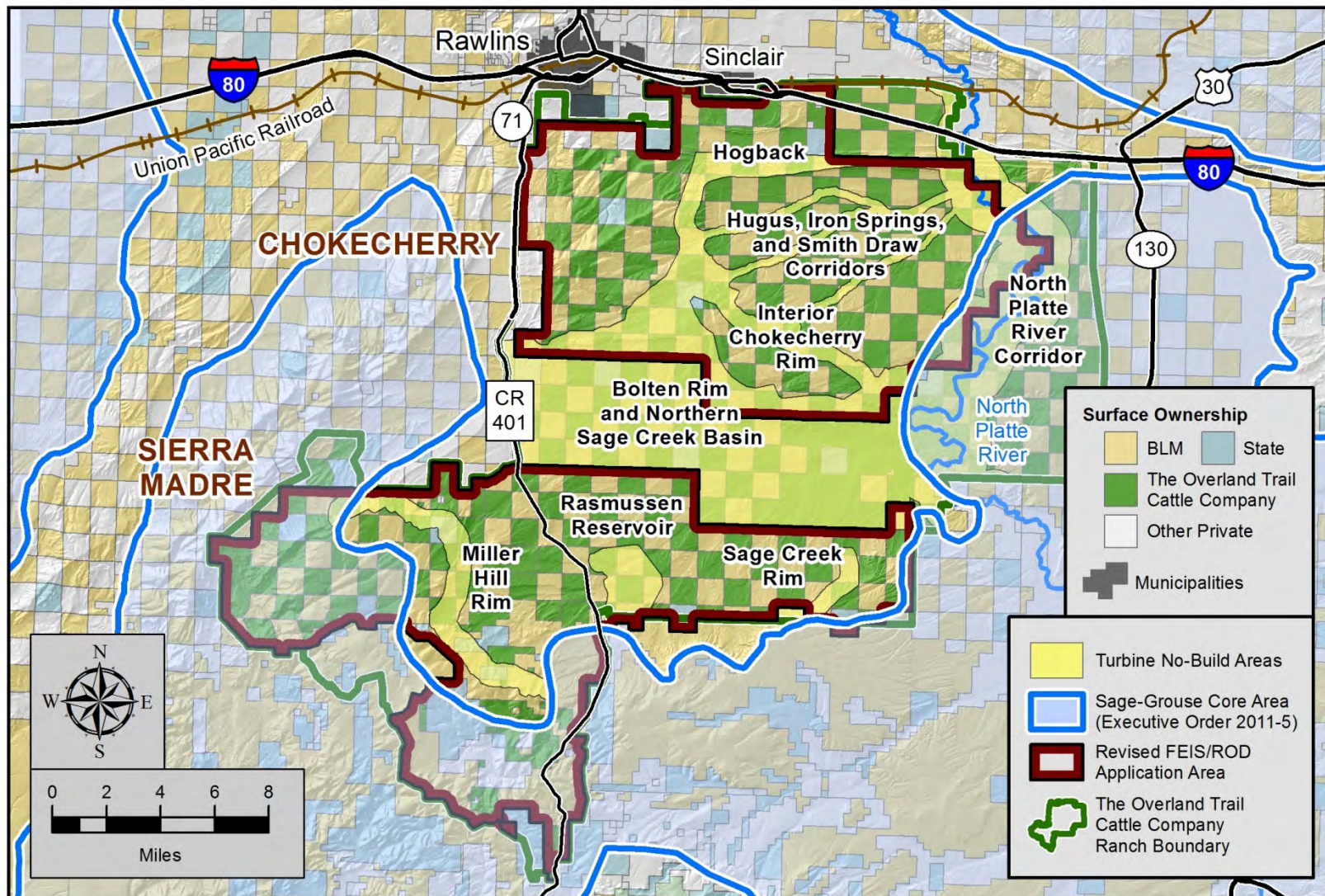


Figure 5.7. Turbine No-Build Areas for the CCSM Project.

### ***Bolten Rim and Northern Sage Creek Basin***

A Turbine No-Build Area was designated from the Bolten Rim south to the northern extent of the Sierra Madre WDA and from the Bolten Rim north into adjacent portions of the Chokecherry WDA. *See Figure 5.7.* This Turbine No-Build Area was developed based on survey observations made during long-watch raptor surveys and radar observations of golden eagle use surrounding occupied nests along the Bolten Rim. Observations of golden eagle use surrounding occupied nests on the Bolten Rim demonstrate that the majority of use occurs in the Turbine No-Build Area south of the Bolten Rim where raptor prey resources, perching locations, and suitable soaring conditions are present. The observations are consistent with the observed use of raptors using the Bolten Rim for nesting and perching opportunities.

The Bolten Rim and Northern Sage Creek Basin Turbine No-build Area consists of intact tracts of salt-desert shrub, sagebrush steppe, upland grassland, open water reservoirs, and agricultural pastures. These vegetation communities provide suitable habitat for most migratory bird and bat species of concern that occur within the CCSM Project Site. *See Section 4.3.1.* The Bolten Rim also provides suitable nesting and perching substrate for a number of raptor species; known nesting areas of white-throated swifts and cliff swallows; and potential roost locations for crevice-roosting bats. Designation of the Turbine No-Build Area conserves habitat for the majority of the migratory bird and bat species of concern listed in Table 1.1 and Table 1.2.

South of the Bolten Rim, the Turbine No-Build Area is 5- to 6-kilometers (3- to 4-miles) wide to avoid placement of wind turbines in the highest quality raptor foraging locations identified within the CCSM Project Site and near reservoirs used by waterbird/ waterfowl species. The area south of the Bolten Rim contains the highest density white-tailed prairie dog colonies within the Ranch and three reservoirs (Kindt, Sage Creek, and Teton) that are used by multiple waterbird/ waterfowl species throughout much of the year. *See PCW 2015a. See Section 4.4.1.* Avoiding placement of wind turbines near the reservoirs will reduce impacts to the waterbird/ waterfowl species that use the reservoirs and surrounding areas for migration and nesting activities. In addition, this area provides a suitable, wide flight/movement corridor from Atlantic Rim and Miller Hill to the North Platte River.

Along the eastern half of the Bolten Rim to the north, the Bolten Rim and Northern Sage Creek Rim Turbine No-Build Area provides a 1600- to 2400-meter-wide (1- to 1.5-mile-wide) setback from the rim. Along the western half of the Bolten Rim to the north the Turbine No-Build Area provides a 800- to 3200-meter-wide (0.5- to 2-mile-wide) setback. The setbacks north of the rim avoid and minimize risks to identified nests and nesting substrates for raptors and cliff-dwelling migratory birds and bats. The setbacks also avoid and minimize impacts to species that may use the Bolten Rim for soaring, kiting, perching, or foraging activities. This setback also benefits the other migratory bird and bat species that utilize the habitats contained in this Turbine No-Build Area.



### ***Hogback***

A Turbine No-Build Area was designated along the hogback feature north of Chokecherry WDA. See *Figure 5.7*. PCW's Original Proposed Action identified wind turbine locations in this area. During raptor nest and avian use surveys of the CCSM Project Site several occupied raptor nests were identified along the hogback. This Turbine No-Build Area minimizes risks to nesting raptors and other migratory birds and bats by removing the potential for wind turbine development in this area.

In addition to avoiding and minimizing impacts to raptors, this Turbine No-Build Area conserves habitat for many of the migratory bird and bat species of concern listed in Table 1.1 and Table 1.2. Vegetation communities in this Turbine No-Build area consist of salt-desert shrub, sagebrush steppe, upland grassland, barren/sparsely vegetated, and disturbed/developed areas. These vegetation communities provide suitable habitat for many of the upland avian species that occur within the CCSM Project Site, including the passerines and raptors listed in Table 1.1 as well as long-billed curlew and mountain plover. The area also provides potential roost locations for crevice-roosting bats.

### ***Interior Chokecherry Rim***

Long-watch raptor surveys identified that raptor use immediately west of the Interior Chokecherry Rim was substantially higher relative to other areas of the CCSM Project Site. The aspect of the Interior Chokecherry Rim is west to southwest and, as that is the predominant wind direction at the CCSM Project Site, the rim provides suitable topography to create uplift and slope-soaring conditions for movement through the Chokecherry WDA. The designation of a Turbine No-Build Area in the 1200- to 3200-meter-wide (0.75- to 2-mile-wide) corridor west and southwest of the Interior Chokecherry Rim provides connectivity to the area north of the Chokecherry WDA, the North Platte River corridor, and the Turbine No-Build Areas adjacent to the Bolten Rim; thus, providing for the use of this contiguous area as a flight/movement corridor. See *Figure 5.7*.

While this Turbine No-Build Area primarily benefits raptors, the avoidance of wind turbine development in the sagebrush steppe and upland grassland habitats adjacent to the Interior Chokecherry Rim will protect and conserve other migratory bird species that use these habitats. Additionally, the width of the corridor provides a substantial movement and migration corridor through the Chokecherry WDA for all migratory bird and bat species.

### ***North Platte River Corridor***

While this Turbine No-Build Area is outside of Phase I, PCW has committed to not construct wind turbines within 1600 meters (1 mile) of the North Platte River. Surveys have identified that the North Platte River corridor provides nesting habitat for a number of raptor, migratory bird, waterbird/ waterfowl, and bat species. This corridor provides the only forested riparian habitat in the vicinity of the CCSM Project. This habitat type provides nesting, foraging, and migratory habitat for a number of avian species, including the raptor, bat, and waterbird/ waterfowl species listed in Table 1.1 and Table 1.2. In addition, the cliff habitats adjacent to the river provide suitable nesting substrate for raptors as well as

several migratory bird species including cliff swallows and white-throated swifts. *See Figure 5.7.* Finally, the forested riparian habitat and cliff habitat within this Turbine No-Build Area also provides suitable habitat for tree-roosting bat species and crevice-roosting bat species, as well as the highest quality foraging habitat for bats in the vicinity of the CCSM Project.

#### ***Hugus, Iron Springs, and Smith Draw Corridors***

While this Turbine No-Build Area is outside of Phase I, data collected during long-watch raptor surveys indicate that raptors periodically use the areas immediately over Smith, Iron Springs, and Hugus draws to move between the Interior Chokecherry Rim and the North Platte River corridor. To reduce potential impacts, PCW has designated a 250-meter-wide area on either side of each draw as a Turbine No-Build Area to provide contiguous flight/movement corridors between the North Platte River and Interior Chokecherry Rim. *See Figure 5.7.* In addition to protecting raptors, this Turbine No-Build Area conserves habitat for a number of migratory bird species that use the sagebrush steppe and salt-desert shrub habitats located along these ephemeral drainages. These habitat types provide suitable nesting and foraging habitat for sagebrush-obligate bird species as well other migratory birds in the CCSM Project Site.

#### ***Miller Hill Rim***

The area 1,200 to 1,600 meters (0.75 to 1 mile) east and north of Miller Hill Rim was designated as a Turbine No-Build Area to avoid and minimize impacts to raptors and other migratory bird and bat species that use mountain shrub and aspen-mixed conifer habitats. *See Figure 5.7.* The corridor adjacent to Miller Hill Rim also provides a flight/movement corridor between areas south of the CCSM Project in greater sage-grouse Core Areas with the Atlantic Rim and other areas north of the CCSM Project. Because prevailing winds are from the west and southwest, Miller Hill Rim does not provide suitable uplift and slope-soaring conditions for raptors except in the rare event of winds from the east and north. In addition to providing flight corridors through the CCSM Project Site, the Miller Hill Rim Turbine No-Build Area also conserves the aspen/mixed conifer woodland, mountain shrub, sagebrush steppe, and other habitats adjacent to Miller Hill. These habitats provide suitable nesting and foraging conditions for a number of migratory bird species, including American robin, black-capped chickadee, dark eyed junco, green-tailed towhee, northern flicker, American goldfinch, mountain bluebird, and rock wren, and the bat species listed in Table 1.2. *See Section 4.2.1.*

#### ***Rasmussen Reservoir***

While the area surrounding Rasmussen Reservoir is outside of Phase I, a 2.4- to 3.2-kilometer-wide (1.5- to 2-mile-wide) Turbine No-Build Area was established south of the reservoir to provide a foraging and flight/movement corridor for nesting bald eagles. *See Figure 5.7.* While originally designated for the benefit of bald eagles, the designation of this corridor also benefits other raptor and migratory bird species. Waterbird/ waterfowl surveys at Rasmussen Reservoir identified more than 30 species of waterbird/ waterfowl that use the reservoir for migration, foraging, or nesting. *See Section 4.4.1.*



### ***Sage Creek Rim***

While this area is outside of Phase I, PCW established a Turbine No-Build Area north of the Sage Creek Rim to maintain a flight/movement corridor that was observed during raptor use surveys. *See Figure 5.7.* During 2011 and 2012 long-watch raptor surveys, flight path data indicated that a corridor 800- to 1200-meters (0.5- to 0.75-mile) wide north of the Sage Creek Rim was consistently used by raptors moving from the west to the east along the southern edge of the Sierra Madre WDA. The aspect of the Sage Creek Rim faces to the northwest and provides potential soaring opportunities as the predominantly southwesterly and westerly winds interact with this topographic feature. In addition to providing protections for raptors, this Turbine No-Build Area also conserves mountain shrub and salt-desert shrub habitats; these habitats provide nesting and foraging opportunities for a number of migratory bird species in the CCSM Project Site.

#### **5.1.7 Revision 5, Initial Phase I Site-Specific Plan of Development - April 2013**

As described in chapter 1.0 of this Phase I BBCS, BLM's ROD outlined a specific process in which PCW will submit site-specific PODs to BLM for subsequent tiered NEPA analysis. In compliance with this process, PCW divided the CCSM Project into two phases for final design and subsequent analysis. For purposes of developing the site-specific PODs for Phase I, PCW again revised the wind turbine layout for the CCSM Project to create the initial wind turbine layout for Phase I. Revision 5 to the layout incorporated the Turbine No-Build Areas and all of the requirements set out in BLM's ROD. The Revision 5 layout also considered the most recent environmental data and information for Phase I, including the most recent migratory bird and bat survey data.

Revision 5 to the wind turbine layout incorporated appropriate avoidance and minimization measures related to migratory bird and bat use areas, the terms and conditions of Carbon County's Conditional Use Permit for the CCSM Project, and the USFWS avoidance and minimization recommendations received prior to the revision. *See Figure 5.8.*

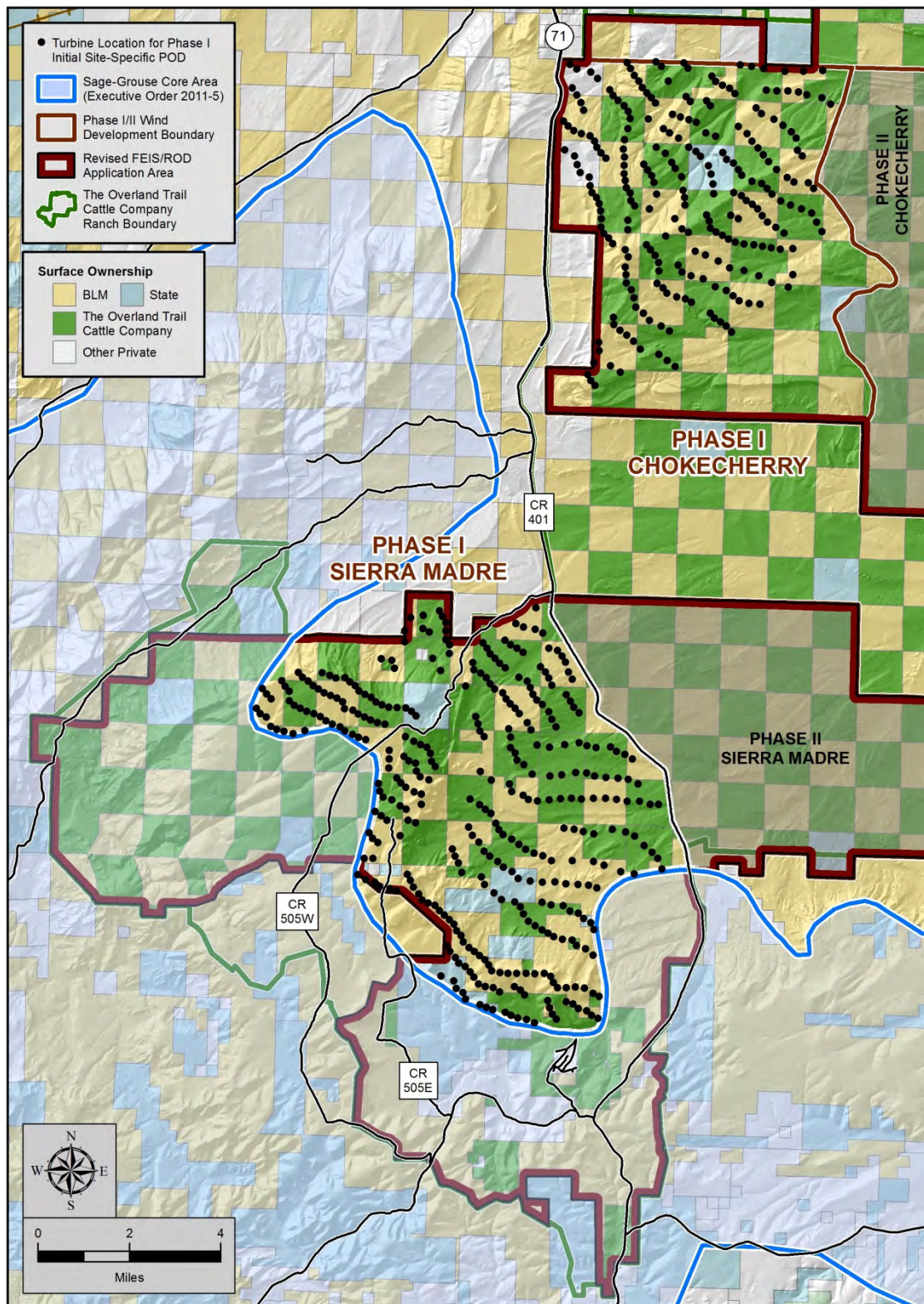


Figure 5.8. Revision 5: Initial Phase I Site-Specific Plan of Development – April 2013.



#### **5.1.8 Revision 6, Final Phase I Site-Specific Plan of Development – January 2014**

Revision 5 of the Phase I wind turbine layout was the basis for PCW's micrositing process and pre-construction surveys for Phase I. *See Section 3.1.1.* Beginning in April 2013, PCW conducted engineering field reviews and pre-construction surveys for BLM sensitive species and USFWS threatened and endangered species, Class III cultural resource surveys, and soil, vegetation and aquatic surveys for Phase I, as well as other required pre-construction surveys and inventories. Concurrent with micrositing and pre-construction surveys, PCW continued to work with USFWS and BLM through the remainder of 2013 to refine the Phase I wind turbine layout. In January 2014, PCW revised the Phase I wind turbine layout again. Through the application of additional avoidance and minimization measures designed to reduce risk to migratory birds and bats, PCW incorporated the best available scientific data, including the extensive migratory bird and bat survey data collected for Phase I. *See Chapter 4.0.* Over 110 of the 500 Phase I wind turbines were moved to new locations within Phase I to address USFWS and BLM requirements and recommendations. *See Figure 5.9.* The final Phase I wind turbine layout represents the culmination of the extensive data collection and avoidance and minimization effort for Phase I that began in 2008.

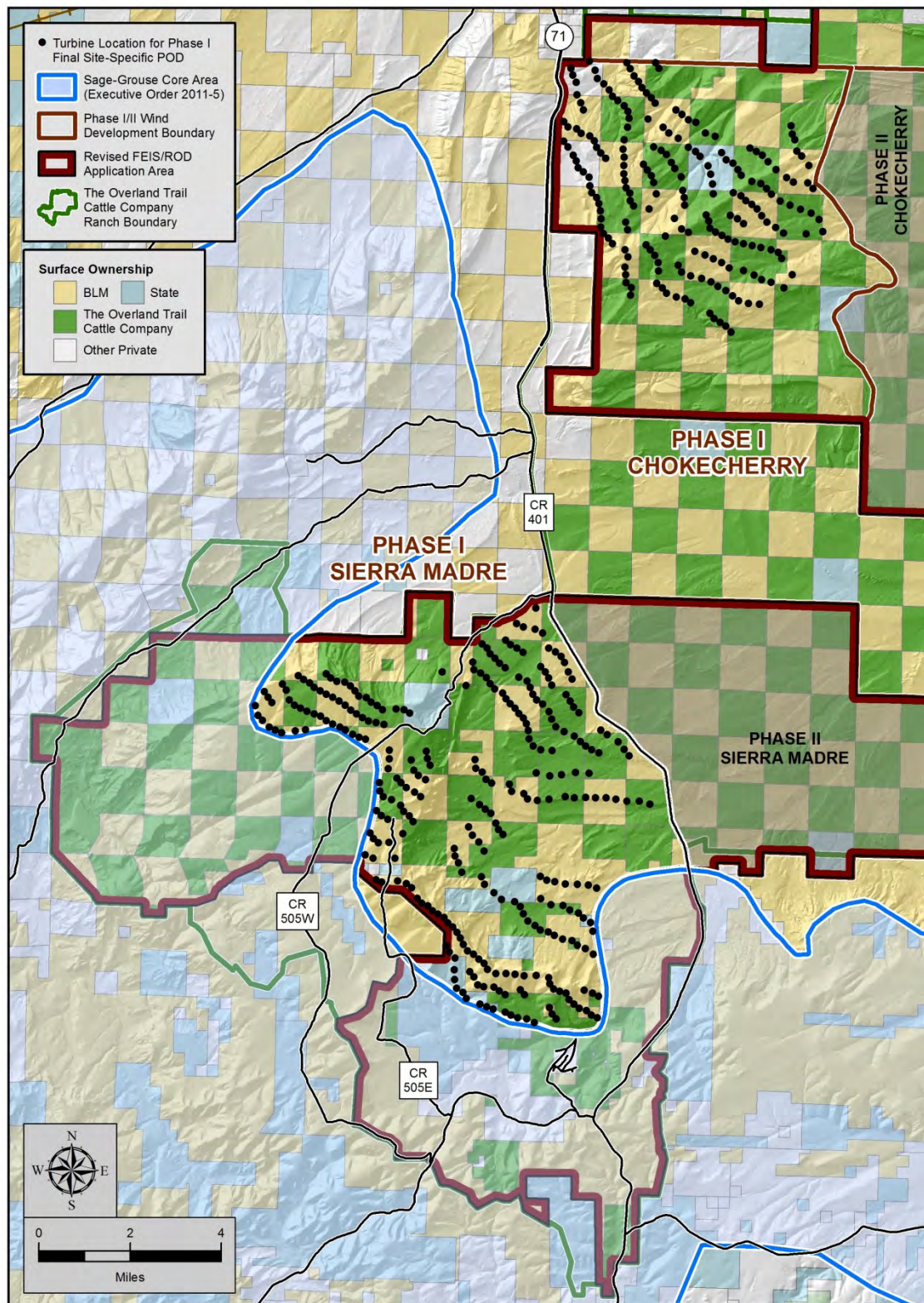


Figure 5.9. Revision 6: Final Phase I Site-Specific Plan of Development – January 2014.



## 5.2 Best Management Practices and Avoidance, Minimization, and Conservation Measures

In accordance with the USFWS Wind Energy Guidelines and the WGFC Wind Energy Recommendations, PCW has developed BMPs and site-specific avoidance, minimization, and conservation measures for Phase I. These measures will reduce risks to migratory birds and bats from Phase I to the extent practicable. It is expected that over the life of Phase I, additional BMPs and conservation measures will be developed. As such, post-construction monitoring and adaptive management will be employed to evaluate the effectiveness of the Phase I BMPs and avoidance, minimization, and conservation measures. Based on the monitoring results, PCW may implement new measures and adjust existing measures as appropriate. *See Chapter 6.0.*

### 5.2.1 Site-specific Avoidance and Minimization Measures

PCW has developed extensive measures to avoid and minimize risks to migratory birds and bats from Phase I. These include: (1) measures identified in BLM's ROD for the CCSM Project; (2) measures to address the risk to migratory birds and bats from the Phase I overhead electrical system; and (3) measures to avoid and minimize risks to bald and golden eagles, many of which also provide a benefit to migratory birds and bats. *See PCW 2015a.* The Phase I site-specific avoidance and minimization measures that benefit migratory birds and bats are described below. Together, these measures avoid and minimize risks to migratory birds and bats from Phase I to the extent practicable.

#### ***Project-specific Avoidance and Minimization Measures***

As described in PCW's site-specific PODs, PCW will comply with the avoidance, minimization, and mitigation measures identified in BLM's ROD for the CCSM Project. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.* Many of the avoidance, minimization and mitigation measures included in the ROD were developed for the benefit of migratory birds and bats, including measures in the following categories:

- Timing stipulations to avoid impacts during sensitive time periods, e.g. nesting seasons
- Spatial stipulations to avoid impacts in sensitive locations, e.g. nest locations
- Measures to avoid impacts to sensitive habitats, e.g. wetland and riparian avoidance areas
- Measures to minimize project impacts, e.g. infrastructure collocation.

PCW has reviewed the BLM Environmental Constraints, Applicant Committed Measures, Applicant Committed Best Management Practices, and Proposed Mitigation Measures included in the ROD to identify those measures that provide a benefit to migratory birds and bats. *See BLM 2012a at App. D.* PCW has identified these measures and described their benefits to migratory birds and bats in Appendix I. Adherence to the avoidance, minimization, and mitigation measures identified in BLM's ROD will substantially avoid and minimize impacts to migratory bird and bat species. *See Appendix I.*

### ***Overhead Electrical System Avoidance and Minimization Measures***

PCW has identified additional avoidance and minimization measures and BMPs to address risks to migratory birds from the Phase I overhead electrical system. Though overhead electric power lines and associated facilities may provide some benefit to migratory bird species by providing increased perching, roosting and nesting opportunities, the addition of overhead electric power lines also creates the risk of migratory bird mortality through electrocutions and collisions. This Phase I BBCS incorporates the applicable recommendations in the APLIC APP Guidelines. *See APLIC 2005*. In addition, the Phase I overhead electrical system is designed to meet APLIC recommendations by ensuring there is sufficient separation between components. *See APLIC 2006; APLIC 2012*.

PCW has incorporated nest management measures in this Phase I BBCS to properly manage nests to avoid and minimize risks to migratory birds. All migratory birds and their active nests are legally protected under the MBTA. For nest management, it is important to determine which species built the nest and whether the nest is active. The MBTA does not clearly define what an active nest is. This being the case, it is left to qualified biologists to determine what constitutes an active nest. For the purposes of applying the avoidance and minimization measures in this Phase I BBCS, a nest will be considered active if it contains eggs or young, and its formal status will remain active as long as adults, viable eggs, and/or living young are present at the nest. A nest may be abandoned, fail, or fledge young and become inactive during the breeding season. *See USFWS 2003*.

PCW has committed to the following measures to avoid and minimize risks to migratory bird and bat species from the Phase I overhead electrical system:

#### ***1. APLIC Recommendation and Standards***

PCW will construct and maintain its overhead electrical system in accordance with APLIC construction recommendations and design standards. *See APLIC 2006; APLIC 2012*. More specifically, as recommended by APLIC, PCW will use the following general construction standards for the Phase I overhead electrical system:

- The overhead electrical system will be designed to meet National Electric Safety Code (NESC) requirements with specialized construction designs for avian use areas.
- The overhead electrical system will be designed to prevent electrocutions by providing adequate conductor separation distances appropriate to the largest species expected in Phase I.<sup>22</sup> When this is not feasible, insulation or isolating measures will be used.
- The Phase I overhead electrical system equipment will include bushing covers and covered jumpers.

---

<sup>22</sup> Golden eagles are the largest avian species in the vicinity of Phase I. Separation distances recommended for golden eagles are currently 60 inches of horizontal separation and 40 inches of vertical separation for phase-to-phase and phase-to-neutral (or phase-to-ground).



- The Phase I overhead electrical system arresters and cutouts will be installed with wildlife caps and covered jumpers.
- The Phase I overhead electrical system primary jumpers that do not meet separation requirements will be covered with insulation.

## *2. Flight Diverters and Line Markers*

In areas posing a high-risk for avian collisions (e.g., near open bodies of water, wetlands, nesting habitats, ridgelines) or in areas of high collision mortality identified through post-construction monitoring, PCW will install flight diverters or line markers on overhead electric power lines as appropriate.

## *3. Vegetation Removal*

In areas necessary for construction, or in areas requiring vegetation disturbance as part of operations and maintenance activities, vegetation that might support migratory bird nesting activities will be removed prior to the spring migration period. This will minimize the likelihood of nest establishment and impacts during construction activities. When vegetation removal is not possible prior to spring migration, a qualified biologist will conduct a nest survey no more than 14 days prior to work. If an active nest is present, then all work that might disturb the nest will be postponed until appropriate avoidance and minimization measures are identified.

## *4. Nest Management*

PCW will manage migratory bird nests for Phase I overhead electric power lines, wind turbines, and other project infrastructure in compliance with MBTA. Inactive nests may be removed and/or destroyed in compliance with the MBTA, unless they are nests of listed species or eagles. When possible, PCW will manage nests outside of the nesting period between mid-August and February. If nest management is not possible outside the nesting period, PCW will have the nest checked by a qualified biologist as appropriate to determine whether the nest is active.

## *5. Nest Removal*

Removal of active nests is unlikely. However, in some cases, removal of active nests may be required for reasons of human health and safety, safety of the nesting bird, or to avoid damage to project infrastructure. PCW will address the need for removal of active problem nests on a case-by-case basis and in coordination with the USFWS.

### ***Phase I ECP Avoidance and Minimization Measures***

As described in the Phase I ECP, PCW and USFWS have worked cooperatively since 2010 to avoid and minimize impacts to bald and golden eagles from Phase I. USFWS provided PCW with detailed avoidance and minimization recommendations for Phase I and PCW developed appropriate site-specific measures to address those recommendations in the Phase I ECP. Many of the avoidance and minimization measures developed by PCW to reduce risks to bald and golden eagles also provide significant benefits to migratory bird and bat species that use the same nesting substrates, habitats, foraging areas, and topographic features. In addition, the wind turbine avoidance areas established in the Phase I ECP include habitats used by other migratory bird and bats species, e.g. sagebrush steppe, salt-desert shrub, and upland grassland habitats. The benefits to migratory birds and bats from the wind turbine avoidance areas established in the Phase I ECP are captured in the discussion of the Phase I risk avoidance and minimization process in section 5.1. Please refer to the Phase I ECP for a more detailed discussion of the other Phase I ECP avoidance and minimization measures. *See PCW 2015a.*

#### **5.2.2 Best Management Practices**

Chapter 7 of the USFWS Wind Energy Guidelines and Appendix A of the WGFC Wind Energy Recommendations provide a list of standard BMPs for wind energy projects. As noted by USFWS and WGFC, these BMPs are not applicable to every wind project; instead, they are intended to be applied based on site-specific data and project characteristics. PCW has reviewed the USFWS and WGFC recommended BMPs and has incorporated the applicable recommendations into Phase I as described below.

#### ***USFWS Construction and Operation BMPs***

In accordance with chapter 7 of the USFWS Wind Energy Guidelines, PCW has incorporated BMPs for construction and operation into Phase I. *See USFWS 2012a.* The implementation of these BMPs will reduce potential impacts to migratory bird and bat species. As recommended by USFWS in the Wind Energy Guidelines, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I:<sup>23</sup>

1. PCW has minimized, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.
2. PCW has avoided locating wind energy facilities in areas identified as having a demonstrated and un-mitigatable high risk to migratory birds and bats.

---

<sup>23</sup> The numbering of this BMP list corresponds to the numbering of the BMP recommendations in chapter 7 of the USFWS Wind Energy Guidelines. *See USFWS 2012a at pp.49:51.*



3. PCW has used available data from state and federal agencies, specifically BLM, WGFD and USFWS, to identify sensitive resources and establish the layout of roads, power lines, fences, and other infrastructure.
4. PCW has minimized, to the extent practicable, roads, power lines, fences, and other infrastructure. Where appropriate, PCW will use wildlife compatible design standards for fencing.
5. PCW will use native species when seeding or planting during reclamation in compliance with the Reclamation Plans for Phase I. *See PCW 2015b.*
6. PCW has located collection system power lines underground to the extent practical. All overhead power lines for Phase I are designed to meet APLIC recommendations. *See APLIC 2006; APLIC 2012.*
7. All permanent meteorological and communication towers for Phase I will be self-supporting, i.e. not guyed. *See PCW 2015b.*
8. PCW has designed Phase I to include the minimum number of permanent meteorological towers necessary.
9. PCW will use construction and management practices that minimize activities that may attract prey and predators. *See Appendix I.*
10. Lighting of Phase I wind turbines will meet FAA requirements and will likely consist of medium intensity synchronized red LED lights. Only a portion of the wind turbines will be lit. *See PCW 2015b.*
11. Exterior lighting at operation and maintenance facilities and substations for Phase I will be shielded downward and is designed to use a combined switch and motion-detection system for exterior lights to minimize the time the lights are on while providing adequate safety for personnel. All internal wind turbine nacelle and tower lighting will be used only when personnel are inspecting or maintaining the wind turbine. *See PCW 2014c; PCW 2015b.*
12. PCW has designed Phase I to comply with the spatial and timing stipulations required by BLM in the ROD. These stipulations address sensitive habitats and species. *See Appendix I.*
13. PCW has designated Turbine No-build Areas to provide sufficient flight/movement corridors for migratory bird and bat species.

14. PCW has created an Erosion Control Plan and a preliminary Stormwater Pollution Prevention Plan for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
15. PCW will use tubular wind turbine towers to reduce ability of birds to perch and to reduce risk of collision. *See PCW 2015b.*
16. PCW has agreed to work with BLM and TOTCO to close unnecessary roadways and reclaim such roads where practicable. *See Appendix I.*
17. PCW has minimized the number, size, and length of Phase I roads to the extent practicable. *See Appendix I.*
18. PCW has designed Phase I to minimize impacts to wetlands and waters of the U.S. *See Appendix I.*
19. PCW will instruct personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.
20. All employees, contractors, and site visitors will receive a site orientation during which they will be instructed to avoid harassment and disturbance of wildlife. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
21. PCW will comply with fire prevention standards and will develop a fire safety plan to reduce fire hazard from vehicles and human activities. The health and safety plan will address measures to be taken in the event of a wildfire. *See Appendix I.*
22. PCW will develop a hazardous material management plan as part of the health and safety plan. This plan will address employee training and spill response procedures. *See Appendix I.*
23. PCW has developed a weed management plan for Phase I that will reduce the introduction and spread of invasive species. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
24. PCW will comply with all applicable rules and regulations for invasive species control.
25. PCW has developed a waste management plan for Phase I that includes appropriate good housekeeping procedures. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
26. PCW will promptly remove large animal carcasses.
27. PCW has proposed wildlife habitat enhancements located outside of Phase I. *See Section 5.2.3.*

### ***USFWS Decommissioning BMPs***

In accordance with chapter 7 of the USFWS Wind Energy Guidelines, PCW has incorporated best management practices for decommissioning and reclamation into Phase I. *See USFWS 2012a*. The use of these best management practices will reduce potential impacts to migratory bird and bat species. As recommended by USFWS in the Wind Energy Guidelines, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I:<sup>24</sup>

1. PCW will decommission Phase I to minimize new surface disturbance and minimize the removal of native vegetation, to the extent practicable. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*.
2. PCW will remove the pedestal portion of the wind turbine foundations. *See PCW 2015b*.
3. PCW has developed a Reclamation Plan for Phase I that addresses removal and storage of topsoil, as well as appropriate revegetation. *See PCW 2015b*.
4. PCW has developed a Reclamation Plan for Phase I that addresses soil stabilization and revegetation. *See PCW 2015b*.
5. PCW has developed a Reclamation Plan for Phase I that addresses landscape restoration, including hydrology. *See PCW 2015b*.
6. PCW has developed weed control plans that address the monitoring and control of noxious weeds. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b*. In addition, the Reclamation Plan for Phase I includes monitoring during revegetation until reclamation standards are achieved. *See PCW 2015b*.
7. At the end of the CCSM Project, PCW will decommission unnecessary overhead power lines, including poles. *See PCW 2015b*.
8. PCW will install and monitor erosion control measures during reclamation in accordance with the Reclamation Plan for Phase I until reclamation standards are achieved. *See PCW 2015b*.
9. At the end of the CCSM Project, PCW will remove any unnecessary fencing. *See Appendix I*.

---

<sup>24</sup> The numbering of this BMP list corresponds to the numbering of the BMP recommendations in chapter 7 of the USFWS Wind Energy Guidelines. *See USFWS 2012a at p. 52*.



10. PCW has developed preliminary Spill Prevention Control and Countermeasures Plans for Phase I to address petroleum product releases. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.* These plans will be finalized prior to the commencement of Phase I construction. In addition, the Reclamation Plan and Waste Management Plan for Phase I address the proper disposal of unsuitable soil, including contaminated soil. *See PCW 2015b.*

#### ***WGFC Wind Energy Development BMPs***

In accordance with Appendix A of the WGFC Wind Energy Recommendations, PCW has incorporated BMPs for wind energy development into Phase I. *See WGFC 2010 at App. A.* The implementation of these BMPs will reduce risks to migratory bird and bat species. *See WGFC 2010.* Many of the BMP recommendations for wind energy development included in the WGFC Wind Energy Recommendations are applicable to wildlife species other than migratory birds and bats. Only those BMPs that apply to migratory birds and bats are addressed in this section. As recommended by WGFC in the Wind Energy Recommendations, PCW has developed the following BMPs benefitting migratory bird and bat species for Phase I:

1. PCW has coordinated extensively with USFWS, BLM, and WGFD to assess risks and avoid and minimize potential impacts to migratory birds and bats from Phase I.
2. PCW has completed vegetation and habitat mapping as appropriate for Phase I.
3. PCW will post and enforce speed limits during construction, operation, maintenance, and decommissioning of Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
4. PCW will construct and maintain overhead electric lines in accordance with APLIC construction recommendations and design standards. *See APLIC 2006; APLIC 2012. See Section 5.2.1.*
5. PCW has designed Phase I roads to minimize stream crossings to the extent practicable.
6. PCW will use non-guyed meteorological towers for Phase I. *See PCW 2015b.*
7. PCW, in coordination with WGFD and USFWS, has determined appropriate wind turbine set-backs from topographic features for Phase I based upon site-specific data and information. *See Section 5.1.*
8. PCW has minimized the surface disturbance associated with the Phase I, including roads, fences and other ancillary features, to the extent practicable to meet the needs of the Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*

9. PCW will install fencing and signage as needed to protect public safety and prevent unauthorized access. Existing public access to federal and state lands will remain unchanged. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
10. As described in this Phase I BBCS, PCW has designed Phase I to avoid and minimize migratory bird and bat collisions.
11. PCW has designed permanent lighting for ancillary facilities to be motion-activated and shielded downward. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
12. PCW will consult with existing landowners, BLM, and WGFD to evaluate the location and design of any proposed new fences for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*
13. PCW has incorporated appropriate timing and spatial stipulations into Phase I, as described in the CCSM Project ROD. *See BLM 2012b at App. D.*
14. PCW has inventoried noxious and invasive plants within Phase I and has developed a Weed Management Plan to control the spread of noxious and invasive plant species. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.*

### 5.2.3 Conservation Measures

In addition to site-specific avoidance and minimization measures and BMPs, PCW has developed conservation measures to further reduce potential impacts to migratory birds and bats from Phase I. These measures will reduce impacts by removing threats from wind turbines and other infrastructure, as well as reduce risks that could be associated with changes in the availability of habitat within Phase I. The following conservation measures have been incorporated into Phase I:

#### 1. Land Management

PCW's affiliate, TOTCO, currently manages an agricultural operation consisting primarily of cattle grazing and hay production within the Phase I Development Area and in adjacent portions of the Ranch. TOTCO uses active livestock management to minimize impacts of grazing activities on wildlife and wildlife habitat. PCW and TOTCO have entered into an agreement to promote and maintain through collaborative efforts the availability and use of high quality habitat to sustain and enhance terrestrial and aquatic wildlife populations on the Ranch in conjunction with various land uses, including the continuation of ranching and other agricultural operations as well as development of the wind energy resource. *See Appendix H & J.* The commitments made by PCW and TOTCO in the Conservation Plan and Landowner Agreement include but are not limited to continuing active management of the Ranch with a goal of meeting the Wyoming Standards for Healthy Rangeland, implementing reclamation with the objective of ecosystem reconstruction, and implementing appropriate weed management. These commitments and the other measures

described in the Conservation Plan and Landowner Agreement will be implemented in coordination with BLM and WGFD and will reduce impacts to migratory birds and bats by conserving or enhancing habitat for the life of the CCSM Project, including Phase I.

### *2. Conservation Easement*

PCW will forego installing wind turbines on about 27,500 acres of private land owned by TOTCO that is subject to a wind energy development agreement between PCW and TOTCO. Much of these private lands and the adjoining federal lands have some of the best wind resources in the entire Application Area and they had been proposed for wind energy development. Instead, in conjunction with the commencement of commercial operation of Phase I, PCW will join with TOTCO to place this land into a conservation easement. The conservation easement will prohibit in perpetuity wind development activities on the lands subject to the easement. While the conservation easement will be placed on the 27,500 acres of private land owned by TOTCO on which PCW has wind development rights, the easement will also effectively prevent wind energy development on the interspersed sections of federal land due to the checkerboard land ownership pattern. Therefore, the easement essentially protects approximately 48,000 acres of land. The easement is primarily located in high quality sagebrush steppe habitat located within greater sage-grouse Core Areas. *See Figure 5.10.* By prohibiting wind energy development in these areas, risk to sagebrush obligate bird species, raptors, and many other migratory bird and bat species and their habitats from wind energy development will be eliminated in perpetuity.

### *3. Sagebrush Steppe Habitat Conservation and Enhancement*

PCW has implemented a Sage-Grouse Conservation Plan that provides for monitoring of greater sage-grouse within the Ranch and adjacent areas. *See BLM 2012a, App. B at App. N.* PCW's Sage-Grouse Conservation Plan includes conservation measures that will improve habitat and minimize and/or reduce potential threats to greater sage-grouse and other wildlife species. The measures included in the Sage-Grouse Conservation Plan are designed to conserve greater sage-grouse populations and habitat; however, they also have direct benefits to migratory birds and bats by maintaining/restoring contiguous habitat patches, conserving and promoting prey base populations, and improving sagebrush steppe habitat quality throughout the Ranch.

The conservation measures that will be implemented for the CCSM Project, including Phase I, include the minimization or removal of some existing threats to greater sage-grouse survival and productivity such as, removal and marking of fences, water development projects, and riparian/wetland habitat enhancement. Collectively, these improvements will also benefit migratory bird and bat species. The Greater Sage-Grouse Conservation Plan also provides for the identification of additional conservation projects that will serve to achieve conservation goals. *See BLM 2012a, App. B at App. N.*



#### 4. *Sequencing*

BLM analyzed mitigation measure GEN-1 in its FEIS. GEN-1 states:

“Limit surface disturbance to areas where turbines would be constructed within 12 months with a goal to mitigate impacts from surface disturbance to wildlife, soils, water, and vegetation (e.g., weeds).”

Sequencing construction to minimize the duration of surface disturbance minimizes impacts to habitats used by all migratory bird and bat species. In addition, sequencing construction minimizes the area being constructed at any given time; thus, minimizing disruption and fragmentation.

#### 5. *Mesic Habitat Improvement*

PCW has committed to implement mesic habitat improvement projects on the Ranch. The primary objective of PCW’s proposed mesic habitat improvement projects is to modify water sources to create and enhance natural free-flowing water and wet meadow habitats that are used by many wildlife species including migratory birds and bats. Habitat improvement projects may include installation of upland “bubblers” and water diversions to create and enhance natural free-flowing water, enhance wet meadow habitat, and flood bottomland draws. “Bubblers” may be supplied with water from both artesian wells and other wells actively pumped by windmills. Other habitat improvement projects may include development of additional water sources through water diversion pipelines from existing reservoirs and stock tank pipeline networks. Habitat improvement projects will be completed in a manner to minimize standing water and discourage use by mosquitoes, which might carry West Nile virus.

#### 6. *Relic Agricultural Field Enhancements*

There are approximately 2,023 acres of relic agricultural fields in the eastern portion of the Ranch outside Phase I that are currently dominated with either monocultures of cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum* sp.) or other introduced species. These relic agricultural fields currently provide little value for wildlife, including migratory birds and bats. The primary objective of the relic agricultural field enhancement projects is to establish conditions suitable for year-round use by wildlife species. To achieve these objectives, PCW will plant additional sagebrush/shrub cover and/or establish high-value forage and cover sources in the relic agricultural fields as appropriate. Relic agricultural field enhancements will improve habitat conditions in areas outside Phase I, providing new nesting, foraging, and migration locations for migratory birds and bats.

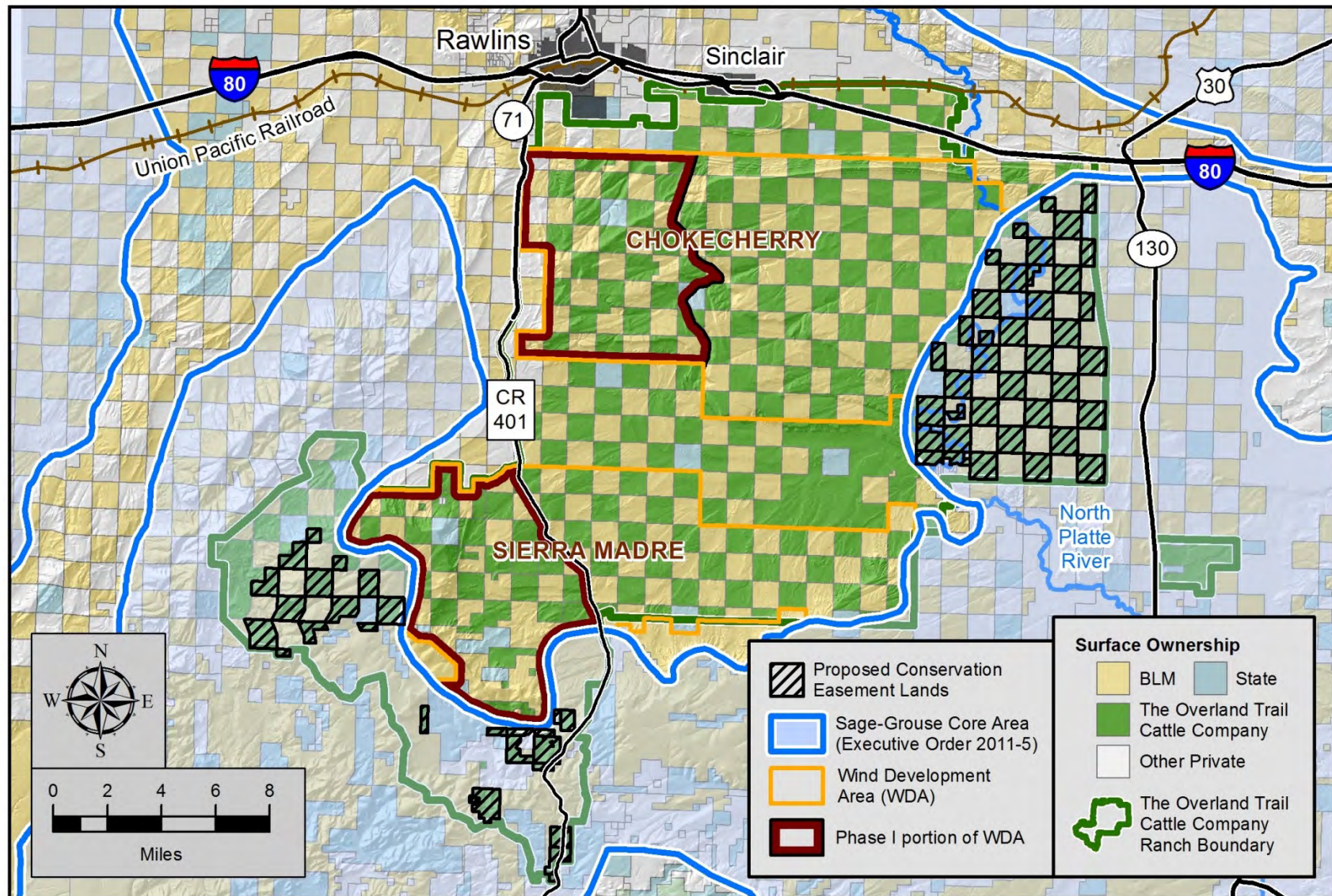


Figure 5.10. Conservation Easements Proposed by PCW in Coordination with TOTCO.



#### *7. Wildfire Emergency Stabilization and Burned Area Rehabilitation*

Wildfire, particularly in low-elevation Wyoming big sagebrush systems, has resulted in significant habitat loss primarily because of subsequent invasion by cheatgrass and other invasive species. See *BLM 2011a*. PCW will work with BLM to prioritize stabilization and burned area revegetation projects on the Ranch to: (1) maintain unburned intact sagebrush habitat when at risk from adjacent threats; (2) stabilize soils; (3) re-establish hydrologic function; (4) promote biological integrity; (5) promote plant resiliency; (6) limit expansion or dominance of invasive species; and (7) re-establish native species. For example, in 2010, a 170-acre wildfire occurred within the Chokecherry WDA. Following the fire, PCW and TOTCO seeded portions of the burned area to stabilize soils, reduce the risk of non-native plant invasion, and encourage use by wildlife species, including migratory birds. Rehabilitating burned areas and conserving intact unburned habitats reestablishes habitat function and use by wildlife species resulting in benefits to migratory bird and bat populations.

#### *8. Water Tank Escape Ramps*

PCW collaborated with the Saratoga High School chapter of the Future Farmers of America to construct and install metal mesh avian escape ladders in water tanks on the Ranch. Escape ramps reduce the risk of drowning to all avian species as well as other wildlife species. See *Lafón 2006*. PCW will continue to install escape ramps in water tanks across the Ranch where there is an identified risk to wildlife.

#### *9. Elimination of Greater Sage-grouse Hunting*

TOTCO has indefinitely suspended access for hunting of greater sage-grouse on all of its private land and other areas under its control, thereby reducing direct mortality of greater sage-grouse, a prey species for several raptor species as well as a potential source of carrion for avian scavengers. Suspension of greater sage-grouse hunting access will continue throughout the life of the CCSM Project, including Phase I, or as otherwise agreed to between PCW, TOTCO and WGFD. Elimination of greater sage-grouse hunting removes any potential carcasses that would be created from injured or unrecovered birds shot by hunters. This removes a potential source of injured birds or carrion containing lead shot that might otherwise attract raptors and avian scavengers. This measure will reduce avian fatalities resulting from lead shot ingestion. Studies have concluded that elevated blood lead levels are prevalent and quantifiable in both bald and golden eagles, and may have a significant impact on eagle populations. See *Allison 2012; Cochrane et al. 2015*. Similar to eagles, risks of lead ingestion may impact raptor and avian scavenger populations. In addition, reduction of mortality to greater sage-grouse, a potential prey species of some raptors, will enhance prey availability and benefit those predator species.



#### *10. Carcass Removal and Handling*

All operation and maintenance staff will be trained to appropriately handle, remove, and dispose of all large animal carcasses that are encountered within the CCSM Project Site, including Phase I. Disposal protocols will be developed in coordination with USFWS and WGFD to ensure compliance with relevant state and federal wildlife statutes. Disposal areas will be located outside of the Phase I Development Area to avoid attracting avian scavengers and other species. Preferred disposal areas might include the conservation easement east of the North Platte River; this would add foraging opportunities for avian scavengers in areas away from Phase I.

#### *11. Winter Access*

Roads will be maintained in winter in accordance with PCW's Winter Access Plan, attached as an appendix to the site-specific PODs for Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.* PCW's Winter Access Plan specifies that where roads are plowed, breaks will be created in any snow banks alongside roads to allow for passage of ungulates across the landscape. This will minimize the likelihood of concentrated ungulate use along roads that may result in increased vehicle collisions that could attract avian scavengers to roadways.

### **5.3 Phase I Risk Assessment**

Consistent with Tiers 1 through 3 of the USFWS Wind Energy Guidelines and Tiers 1 and 2 of the WGFC Wind Energy Recommendations, PCW identified the risks to migratory birds and bats from Phase I of the CCSM Project. *See Chapter 4.0.* Through the implementation of the BMPs and avoidance, minimization, and conservation measures described in chapter 5.0, PCW has reduced the risk to migratory birds and bats from Phase I to the extent practicable; as a result of PCW's extensive efforts, significant impacts to species of concern from Phase I are not anticipated. Therefore, consistent with the recommendations of the USFWS Wind Energy Guidelines, additional mitigation beyond that described in this Phase I BBCS is not necessary. *See USFWS 2012a at p. 53.*

Through the risk avoidance and minimization process described in section 5.1 PCW substantially redesigned the CCSM Project, including Phase I to avoid risk to migratory birds and bats. PCW coordinated with USFWS, BLM, and WGFD to use the extensive data collected in accordance with the USFWS Wind Energy Guidelines and WGFC Wind Energy Recommendations to develop the final Phase I wind turbine layout. The final Phase I wind turbine layout represents the culmination of the extensive data collection and avoidance and minimization effort for Phase I that began in 2008. The final Phase I wind turbine layout minimizes collision risk and habitat disturbance and avoids many of the areas identified as having relatively high use by migratory bird and bat species. *See Section 5.1.*

Following project siting, the remaining risks to migratory birds and bats from Phase I were further minimized through the application of the site-specific avoidance and minimization measures and BMPs identified in section 5.2. These measures include, but are not limited to: (1) timing stipulations to avoid impacts during sensitive time periods; (2) spatial stipulations to avoid impacts in sensitive locations; (3) measures to avoid impacts to sensitive habitats; (4) measures to minimize project impacts; and (5) measures to avoid electrocutions and collisions from Phase I electrical facilities.

The USFWS Wind Energy Guidelines define mitigation as “avoiding or minimizing significant adverse impacts, and when appropriate, compensating for unavoidable significant adverse impacts...” Together with the Phase I siting effort, the measures described in sections 5.2.1 and 5.2.2 avoid and minimize the remaining risks to migratory birds and bats such that significant impacts to species of concern from Phase I are not anticipated. In addition, the conservation measures described in section 5.2.3, e.g. the conservation easement and mesic habitat improvements, provide further benefits to migratory birds and bats by creating, enhancing, and protecting habitats used by migratory birds and bats and removing risks of mortality that are associated with other land use activities that are not related to Phase I.

While complete avoidance of all risks to migratory bird and bat species from Phase I is impossible, the combination of PCW’s Phase I risk avoidance and minimization process along with implementation of the site-specific avoidance and minimization measures, BMPs and conservation measures, ensures that remaining impacts to migratory birds and bats from Phase I are reduced to levels that are not significant to any single species or species group. As a result, the development of Phase I of the CCSM Project is appropriate and is consistent with the USFWS Wind Energy Guidelines, WGFC Wind Energy Recommendations, the requirements of BLM’s FEIS and ROD, and the long-term conservation of migratory bird and bat species.

## **6.0 Post-Construction Migratory Bird and Bat Studies (USFWS Wind Energy Guidelines – Tiers 4 and 5; WGFC Wind Energy Recommendations – Tier 3)**

Consistent with Tiers 4 and 5 of the USFWS Wind Energy Guidelines and Tier 3 of the WGFC Wind Energy Recommendations, PCW has committed to conduct post-construction migratory bird and bat studies for Phase I. Post-construction studies are intended to assess ongoing risk to migratory bird and bat species from Phase I, as well as to evaluate the effectiveness of conservation measures. *See USFWS 2012a at pp. 34:38; WGFC 2010 at p. 38.* Consistent with the USFWS and WGFC recommendations, PCW used the results of the Phase I pre-construction risk assessment to determine the appropriate duration and level of effort for the Phase I post-construction studies. *See USFWS 2012a at p. 34.* As described in section 5.3, PCW has developed extensive avoidance, minimization, and conservation measures for Phase I such that significant impacts to species of concern from Phase I are not anticipated. Therefore, the Phase I post-construction migratory bird and bat studies focus on fatality monitoring as the primary method to assess risk and evaluate conservation measures. PCW will use the adaptive management process described in section 8.4 of this Phase I BBCS to routinely evaluate its post-construction studies and to modify its survey methods and protocols as appropriate.

### **6.1 Migratory Bird and Bat Fatality Monitoring**

PCW will complete post-construction fatality monitoring for migratory birds and bats for Phase I. The primary objectives of the Phase I fatality monitoring are to: (1) determine whether there are any patterns of fatalities within Phase I such that factors associated with those fatalities can be identified and addressed; and (2) evaluate the effectiveness of the Phase I BBCS conservation measures.

PCW's post-construction fatality monitoring for Phase I will assess patterns of migratory bird and bat fatality, species composition, and spatial and temporal attributes of fatalities at Phase I. PCW will divide Phase I into sample areas (i.e., Western Chokecherry, Upper Miller Hill, and Lower Miller Hill;) that represent similar topography, vegetation and other model covariates, and will use a stratified sample approach to ensure that each sample area is surveyed with the same approximate intensity relative to the number of wind turbines and the types of habitats that occur within each area. As the intent of PCW's post-construction monitoring program is to document patterns of mortality rather than quantifying project-wide fatality, PCW will not complete fatality monitoring correction trials (searcher efficiency and carcass persistence).

As provided for in this Phase I BBCS, PCW will review the results of the Phase I migratory bird and bat fatality monitoring program at least annually and, if deemed appropriate, the fatality monitoring program may be modified through the adaptive management process described in section 8.4.



### **6.1.1 Duration**

PCW will conduct migratory bird and bat fatality monitoring during the 24 months following commencement of commercial operation for Phase I. However, Phase I migratory bird and bat fatality monitoring will only be conducted from March 1 through October 31. The data collected for Phase I, including avian radar monitoring, raptor count surveys, migratory bird point counts, and breeding bird surveys, demonstrate that migratory birds and bats rarely use Phase I from early- to mid-October through the beginning of March. *See Chapter 4.0.* In addition, the USFWS Wind Energy Guidelines specifically allow for adjustments in monitoring duration and intervals based on the activity periods for species of concern. *See USFWS 2012a pp. 34:35.* Therefore, PCW will only conduct post-construction fatality monitoring for migratory birds and bats during the site-specific period of use for Phase I, March 1 through October 31. While migratory bird and bat fatality monitoring will not be conducted during the winter non-use period, incidental fatalities discovered during other wildlife surveys or during the course of normal construction, operation, and maintenance activities will be recorded year-round. *See Section 6.3.*

### **6.1.2 Frequency**

The annual migratory bird and bat fatality monitoring period (March 1 through October 31) will be split into 3 separate seasons that are reflective of different migratory bird and bat use patterns: (1) spring season (March 1 through June 15) when spring migration is most likely to occur and prior to initiation of the majority of migratory bird nesting activities; (2) summer season (June 15 through August 15) during the active nesting period for migratory birds; and (3) fall season (August 15 through October 31) prior to winter weather conditions when fall migration is most likely to occur. A total of 30% of the 500 Phase I wind turbines will be monitored once during each season to provide an indication of species-specific, habitat-specific, and geographic patterns of mortality. The 150 wind turbines to be monitored will be randomly selected from the Phase I wind turbines using a Generalized Random Tessellation Stratified selection process to provide spatially-balanced sample stratification across Phase I and its associated habitat types.

### **6.1.3 Protocol**

PCW will conduct migratory bird and bat fatality surveys within a 135 meter by 135 meter square plot oriented such that the largest distance searched (i.e., the diagonal of the square) is aligned in the direction of prevailing winds. *See Erickson et al. 2003.* Line transects within each search plot will be spaced at 6-meter intervals such that the entire search plot area will be covered during each survey. Each searcher will scan for carcasses out to approximately 3 meters with occasional scans out to approximately 10 meters. Following initial surveys, transect widths and search plot sizes for surveys may be adjusted to reflect site-specific conditions.

PCW will collect the following information for each migratory bird and bat fatality monitoring survey:

1. Date
2. Start time
3. End time
4. Interval since last search
5. Searcher name
6. Which wind turbine plot was searched (including decimal-degree latitude longitude or UTM coordinates and datum)
7. Habitat and vegetation characteristics, site topography, and any noticeable changes in conditions since previous visit (i.e., fire, increased or decreased herbaceous canopy height or cover, etc.)
8. Weather data for each search, including wind speed or Beaufort wind scale precipitation, snow cover, cloud cover, or other relevant weather condition
9. Global positioning system (GPS) track of the search path

If a migratory bird or bat fatality is discovered, the searcher will mark the carcass with a flag. After completing the search of that wind turbine, the searcher will immediately return to the flagged carcass to collect carcass data as described below. All carcasses, parts, or feathers will be photo-documented. All potential injuries or lack thereof, signs of scavenging, and identifying characteristics will be documented. The preferred method of recording data will be electronically using a data recording device (such as a field computer or notepad), but the searcher may also record information on a paper form. The searcher will record the following information for each fatality:

1. Date
2. Species
3. Age and sex, if possible
4. Band number and notation if wearing a marker
5. Observer name
6. Wind turbine number or other identifying characteristic
7. Distance of the carcass from the wind turbine
8. Azimuth of the carcass from the wind turbine
9. Decimal-degree latitude longitude or UTM coordinates of the wind turbine and carcass
10. Habitat surrounding the carcass
11. Condition of the carcass (entire, partial, scavenged)
12. Description of the carcass
13. A rough estimate of the time since death (e.g., <1 day, > a week), and how estimated
14. A series of digital photographs of the carcass and landscape surrounding the location
15. Information on carcass disposition

All carcasses will be identified using resources such as *The Sibley Guide to Birds*, *The Feather Atlas*, *A Field Guide to Mammals of North America*, or other appropriate references. *See Sibley 2014; USFWS 2012b; Reid 2006.* For bats in particular, geography, morphometric measures (particularly forearm, but also head and body, tail, ear, foot, and tragus), and other field marks (e.g., hair color, presence of keeled calcar) will be used for identification of each specimen. As needed, PCW will obtain the necessary permits for the collection of carcasses. *See Chapter 7.0.* The information collected (including photographs) will be reviewed annually, as described in section 8.3.

## **6.2 Other Migratory Bird and Bat Monitoring**

PCW has incorporated the post-construction fatality monitoring for migratory birds and bats described in section 6.1 into its Conservation Plan and Landowner Agreement with TOTCO. *See Appendix H.* The Conservation Plan and Landowner Agreement also describes the circumstances under which additional bat acoustic surveys, migratory bird point counts, and raptor nest searches would be conducted for the CCSM Project, including Phase I. The Conservation Plan and Landowner Agreement was developed in coordination with WGFD and is based on the recommendations contained in the WGFC Wind Energy Recommendations. WGFD concurred with the terms and conditions of the Conservation Plan and Landowner Agreement and acknowledged that the agreement satisfies the applicable requirements of the WGFC Wind Energy Recommendations. The post-construction monitoring commitments described in the Conservation Plan and Landowner Agreement will be implemented in coordination with BLM and WGFD.

## **6.3 Incidental Discoveries**

All operations and maintenance staff working on the CCSM Project will be trained on how to identify migratory bird or bat fatalities. Instructions and procedures that personnel must follow in the event that an injured or dead migratory bird or bat is discovered on-site shall be included with the educational information, including whom to notify and what actions must be taken.

Operations and maintenance personnel will not disturb any carcass, but will instead document the location of the migratory bird or bat fatality and notify their supervisor as soon as possible. The supervisor will contact a qualified biologist to record the fatality following the procedures set forth in section 6.1.3.

Incidental discoveries will be recorded year-round during Phase I construction and operation, including after the completion of formal post-construction fatality monitoring. Any migratory bird or bat fatality discovered during times other than the formal migratory bird and bat fatality surveys described in section 6.1.3 will be considered an incidental record. Incidental records will be reviewed with other post-construction monitoring results as described in section 8.3.



#### **6.4 Disposition of Carcasses and Injured Migratory Birds or Bats**

If the necessary permits have been obtained (e.g., a Migratory Bird Special Purpose Utility Permit [SPUT] from the Migratory Bird Program or a Scientific Collection Permit from WGFD), then following the collection of carcass-specific data, PCW (or other permit holder) will remove the carcass from the field as necessary. Final disposition of carcasses will be in accordance with permit terms and conditions or directions from the applicable federal or state agency.

## 7.0 Project Wildlife Permits

PCW may need to obtain the following permits related to migratory bird and bat species from either USFWS or WGFD for Phase I:

- USFWS-issued permits:

- Scientific Collection Permits
- Migratory Bird Special Purpose Utility Permit. *See 50 C.F.R. §21.27.*

A Special Purpose Utility Permit is necessary only if PCW plans to collect, transport, or possess dead migratory birds or parts or contract someone to conduct these activities on its behalf. More detailed information on the applicability of this permit and its requirements are set out in the Service's handout titled "What you should know about a Federal Migratory Bird Special Purpose Utility Permit," which can be accessed at: <http://www.fws.gov/forms/3-200-81.pdf>

- WGFD-issued permits:

- Wildlife possession permits. *See Wyoming Game and Fish Commission Regulations, Chapter 10.*
- Scientific collection permits. *See Wyoming Game and Fish Commission Regulations, Chapter 33.*

The need for additional wildlife permits for Phase I, if any, will be identified as part of the adaptive management process. *See Section 8.1.*

USFWS will determine and provide the conditions of any permits issued by USFWS. State permit conditions will be determined and provided by WGFD.

## 8.0 Administration

Information related to the administration of this Phase I BBCS is outlined below. This chapter contains: (1) contact information for key personnel; (2) a brief description of PCW's training program for Phase I personnel; (3) information on the Phase I BBCS recordkeeping; and (4) a description of the Phase I BBCS adaptive management program.

### 8.1 Contact Information

The Environmental and Construction Compliance Monitoring Program for Phase I designates the key management and environmental personnel who will be responsible for compliance during construction of Phase I. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.* However, as construction of Phase I is not yet underway, the majority of the construction management and compliance personnel are identified by title only. Table 8.1 will be updated and provided to USFWS and WGFD prior to commencement of construction for Phase I.

**Table 8.1. Phase I Contact Information.**

Position	Name	Phone
Vice President, Land and Environmental Affairs	Garry Miller	303-298-1000
Vice President and General Counsel	Roxane Perruso	303-298-1000
Director of Engineering	Ryan Jacobson	303-298-1000
Senior Environmental Engineer	Kelly Cummins	303-298-1000
Project Manager	To Be Determined	To Be Determined
Construction Manager	To Be Determined	To Be Determined
Compliance Manager	To Be Determined	To Be Determined
Senior Biologist	To Be Determined	To Be Determined



## 8.2 Personnel Training

As part of the Environmental Compliance and Monitoring Plan for Phase I, PCW will implement an environmental training program to support compliance with environmental permits, including the permit requirements and conservation measures outlined in this Phase I BBCS. *See PCW 2014b; PCW 2014c; PCW 2014d; PCW 2015b.* The training program will be designed to consistently communicate requirements for Phase I to every individual working on-site so that both managers and workers understand PCW's expectations, the permit requirements, and how to incorporate them into their daily work activities. All personnel working on Phase I will be required to attend environmental training prior to working on-site. PCW will maintain environmental training attendance records on-site.

Elements of PCW's environmental training program will follow the training course format recommended by APLIC and will incorporate site-specific training to minimize risks to migratory birds and bats. *See APLIC 2006; APLIC 2012.* Further, all construction, operation and maintenance staff working on Phase I will be trained on how to identify migratory bird or bat fatalities. Instructions and procedures that personnel must follow in the event that an injured or dead migratory bird or bat is discovered on-site shall be provided with the environmental training information, including whom to notify and what actions must be taken.

## 8.3 Recordkeeping and Reporting

PCW will keep detailed electronic records of the post-construction migratory bird and bat fatality monitoring. The records will include all fatality data collected, including incidental records. PCW will review the results of the post-construction migratory bird and bat fatality monitoring annually. Post-construction fatality monitoring results will be reviewed in the context of spatial and seasonal distribution. As warranted, PCW will propose modifications to the monitoring protocol and/or conservation measures for consideration under the adaptive management framework. *See Section 8.4.* Following the completion of post-construction fatality monitoring, PCW will continue to collect incidental fatality records for Phase I. PCW will review these records annually using the adaptive management framework. *See Section 8.4.* Following PCW's annual review of this Phase I BBCS and the recorded migratory bird and bat mortality, PCW will provide USFWS and WGFD with a summary of the Phase I migratory bird and bat mortality and a description of any modifications to the post-construction monitoring protocols or conservation measures. In addition, PCW will report information to USFWS and WGFD in accordance with the requirements and conditions of any applicable scientific collection, wildlife possession, or special purpose utility permits. *See Chapter 7.0.*

All post-construction monitoring reports PCW submits to USFWS, WGFD, BLM and other state and federal agencies will be considered confidential and not subject to public disclosure, as provided for under the exemptions applying to confidential commercial information under the Freedom of Information Act and Wyoming state statutes. *See U.S.C. § 552(b)(4) & W.S. 16-4-203(d)(v).*

## 8.4 Adaptive Management

As described in the USFWS Wind Energy Guidelines, “[a]daptive management is an iterative learning process producing improved understanding and improved management over time.” *See USFWS 2012a at p. 8 (citing Williams et al. 2009).* The adaptive management process described by USFWS in the Wind Energy Guidelines “gives special emphasis to uncertainty about management effects, iterative learning to reduce uncertainty, and improved management as a result of learning.” *See USFWS 2012a at p. 8.* In fact, the USFWS Wind Energy Guidelines were designed to embody adaptive management by “collecting increasingly detailed information that is used to make decisions about project design, construction, and operation...” *See USFWS 2012a at p. 8.*

In support of the USFWS adaptive management approach to managing risk and uncertainty, PCW has collected a robust pre-construction data set and has also designed an intensive post-construction monitoring program for Phase I. *See Chapters 4.0 & 6.0.* Further, PCW has developed its own adaptive management program for Phase I to use the post-construction data to proactively incorporate adaptive management into Phase I operation.

The intent of the Phase I adaptive management process is to provide a frequent opportunity during post-construction monitoring to evaluate and minimize the uncertainty related to the factors that influence the risk to migratory birds and bats from Phase I. While the goal of this Phase I BBCS is to avoid migratory bird and bat fatalities, it is anticipated that some level of unavoidable mortality will occur despite the application of robust conservation measures. As a result, the Phase I adaptive management process is intended to proactively adjust post-construction monitoring protocols, conservation measures, and BMPs when warranted.

The Phase I adaptive management process will be implemented as follows:

1. PCW will implement the post-construction monitoring protocols, conservation measures, and BMPs set forth in this Phase I BBCS.
2. PCW will review the Phase I post-construction monitoring results and conservation measures annually in the context of the risk to migratory birds and bats from Phase I.
3. Following review of the post-construction monitoring results and conservation measures, PCW will consider adjustments to the post-construction monitoring protocols, conservation measures, and BMPs.
4. As warranted, PCW will implement the adjustments to the post-construction monitoring protocols, conservation measures, and BMPs deemed necessary during the Phase I review.

The Phase I adaptive management process will provide an opportunity for PCW to review the implementation of the monitoring protocols and the avoidance, minimization, and conservation measures included in this Phase I BBCS.

## 9.0 References and Literature Cited

- Allison, T.D. 2012. Eagles and Wind Energy: Identifying Research Priorities. A white paper of the American Wind and Wildlife Institute, Washington, D.C.
- Avian Power Line Interaction Committee (APLIC). 2015. APLIC Recommendations for Power Pole Configurations at Wind Energy Projects. Available online at: <http://www.aplic.org/riser-poles-wind.php>
- . 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA.
- . 2006. Suggested Practices for Avian Protection on Power Lines: the state of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA, USA.
- . 2005. Avian Protection Plan Guidelines. Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service. Washington, D.C.
- Bureau of Land Management (BLM). 2014a. Decision Record for Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, for the Chokecherry and Sierra Madre Wind Energy Project. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. December.
- . 2014b. Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, for the Chokecherry and Sierra Madre Wind Energy Project. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. December.
- . 2014c. Letter from Dennis J. Carpenter to The Overland Trail Cattle Company LLC. January.
- . 2012a. Record of Decision for the Chokecherry and Sierra Madre Wind Energy Project and Approved Visual Resource Management Plan Amendment on Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Carbon County, Wyoming. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, Wyoming. October.
- . 2012b. Chokecherry and Sierra Madre Wind Energy Project Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, Wyoming. June.



- . 2011a. Instruction Memorandum No. 2012-043: Greater Sage-Grouse Interim Management Policies and Procedures. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. December.
- . 2011b. Chokecherry and Sierra Madre Wind Energy Project Draft Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. July
- . 2010. Bald and Gold Eagle Protection Act – Golden Eagle Nation Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy. IM 2010-156. U.S. Department of the Interior, Washington, D.C.
- . 2008a. Record of Decision and Approved Rawlins Resource Management Plan. U.S. Department of the Interior, Bureau of Land Management, Rawlins Field Office, Rawlins, WY. December.
- . 2008b. Instruction Memorandum No. 2009-043: Wind Energy Development Policy. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. December.
- . 2004. Draft Resource Management Plan and Draft Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Rawlins Field Office, Rawlins, WY. December.
- . 1990. Record of Decision and Approved Resource Management Plan for Great Divide Resource Area. U.S. Department of the Interior, Bureau of Land Management, Great Divide Resource Area, Rawlins District, Rawlins, Wyoming. November 1990.
- Chace, J.F., and J.J. Walsh. 2006. Urban effects on native avifauna: a review. *Landscape and Urban Planning*, 74(1):46-69
- Chapman, S.S., S.A. Bryce, J.M. Omernik, D.G. Despain, J. ZumBerge, and M. Conrad. 2004. Ecoregions of Wyoming . GIS shapefile. Available online at:  
[http://www.epa.gov/wed/pages/ecoregions/wy\\_eco.htm](http://www.epa.gov/wed/pages/ecoregions/wy_eco.htm). Accessed February 2014.
- Cochrane, J.F., E. Lonsdorf, T.D. Allison, and C.A. Sanders-Reed. 2015 in Press. Modeling with uncertain science: estimating mitigation credits from abating lead poisoning in golden eagles. *Ecological Applications*.<http://dx.doi.org/10.1890/14-0996.1>
- Devereux, C.L., M.J.H. Denny, and M.J. Wittingham. 2008. Minimal effects of wind turbines on the distribution of wintering farmland birds. *Journal of Applied Ecology*, 45:1689-1694
- Erickson, W.P., K. Kronner, and B. Gritski. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002–August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee. Cheyenne, Wyoming: WEST, Inc., and Pendleton, Oregon: Northwest Wildlife Consultants, Inc.

- Erickson W.P., M.M. Wolfe, KJ Bay, DH Johnson, JL Gehring. 2014. A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi:10.1371/journal.pone.0107491
- Ferrer, M., de Lucas, M., Janss, G. F. E., Casado, E., Muñoz, A. R., Bechard, M. J. and Calabuig, C. P. 2012. Weak relationship between risk assessment studies and recorded mortality in wind farms. *Journal of Applied Ecology*, 49: 38–46.
- Griscom, H.R., M.D. Andersen, and D.A. Keinath. 2012. Bats of southern Wyoming: distribution and migration, year 1 report. Prepared for the USDI Bureau of Land Management, Cheyenne, WY. Prepared by Wyoming Natural Diversity Database, University of Wyoming, Laramie, WY.
- Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Field protocol for spatially-balanced sampling of landbird populations. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO.
- Hayes, J.P. 1997. Temporal variation in activity of bats and the design of echolocation-monitoring studies. *Journal of Mammalogy* 78:514-524.
- . 2000. Assumptions and practical considerations in the design and interpretation of echolocation-monitoring studies. *Acta Chiropterologica* 2:225–236.
- Johnson, G., T. Rintz, and M.D. Strickland. 2008. Raptor Nest Surveys for Chokecherry and Sierra Madre Wind Resource Areas. Carbon County, Wyoming. Prepared by Western EcoSystems Technology, Inc. for ENSR, Golden, Colorado.
- Keinath, D.A. Undated. AnaBat call key for the Greater Yellowstone Ecosystem. Wyoming Natural Diversity Database.
- Kunz, T.H., E.B. Arnett, B.A. Cooper, W.I.P. Erickson, R.P. Larkin, T. Mabey, M.L. Morrison, J.D. Strickland, and J.M. Szewczak. 2007. Assessing impacts of wind energy development on nocturnally active birds and bats: a guidance document. *Journal of Wildlife Management* 71:2449–2486.
- Lafón, A. 2006. Installation of devices in water tanks to prevent drowning of wild animals. In *Grasslands ecosystems, endangered species, and sustainable ranching in the Mexico–U.S. borderlands: Conference proceedings*, USDA Forest Service Proceedings RMRS-P-40, 106–107.
- Lehman, R.N. 2001. Raptor electrocution on power lines: current issues and outlook. *Wildlife Society Bulletin*. 29:804-813.
- Lehman, R.N., P.L. Kennedy, and J.A. Savidge. 2007. The state of the art in raptor electrocution research: A global review. *Biological Conservation* 136:159-174.

Orabona, A., C. Rudd, M. Grenier, Z. Walker, S. Patla, and B. Oakleaf. 2012. Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming. Wyoming Game and Fish Department Nongame Program, Lander.

Power Company of Wyoming LLC (PCW). 2015a. Phase I Eagle Conservation Plan. June.

———. 2015b. Phase I Wind Turbine Development Site-specific Plan of Development. January.

———. 2014a. Chokecherry and Sierra Madre Wind Energy Project Wyoming Industrial Development Information and Siting Act Section 109 Permit Application. May.

———. 2014b. Road Rock Quarry Site-specific Plan of Development. April.

———. 2014c. Phase I Haul Road and Facilities Site-Specific Plan of Development. April.

———. 2014d. West Sinclair Rail Facility Site-Specific Plan of Development. April.

Reid, F.A. 2006. A Field Guide to Mammals of North America North of Mexico. 4<sup>th</sup> ed. The Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. *Condor* 82:309-313.

Rich, T.D., M.J. Wisdom, and V.A. Saab. 2005. Conservation of priority birds in sagebrush ecosystems. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. 2005

Sibley, D. 2014. The Sibley Guide to Birds, 2nd edition. Alfred A. Knopf, Inc., New York, NY.

Solick, D., G. Johnson, T. Rintz, D. Strickland. 2008. Bat Surveys for the Chokecherry and Sierra Madre Wind Resource Areas. Carbon County, Wyoming. Final Report November 29, 2008. Prepared by Western EcoSystems Technology, Inc.

Sterner, D.; Orloff, S.; Spiegel, L. (2007). Wind turbine collision research in the United States, in: de Lucas, M. et al. (Ed.) (2007). *Birds and wind farms: risk assessment and mitigation*. pp. 81-100

U.S. Fish and Wildlife Service (USFWS). 2013a. Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects. Department of the Interior, U.S. Fish and Wildlife Service, Region 6 Migratory Bird Management Office, Lakewood, CO. November.

———. 2013b. Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2. Department of the Interior, U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Washington D.C. April.

———. 2013c. ESA Basics: 40 Years of Conserving Endangered Species. Department of the Interior, U.S. Fish and Wildlife Service, Endangered Species Program, Arlington, VA. January

- . 2012a. Land-Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. Department of the Interior, U.S. Fish and Wildlife Service, Washington D.C. March.
- . 2012b. The Feather Atlas. Forensics Laboratory, U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at: <http://www.fws.gov/lab/featheratlas/>. Accessed May 2014.
- . 2003. Migratory Bird Permit Memorandum. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at: <http://www.fws.gov/policy/m0208.pdf>. Accessed August 2015.
- Weller, T.J., and J.A. Baldwin. 2012. Using echolocation monitoring to model bat occupancy and inform mitigations at wind energy facilities. *Journal of Wildlife Management* 76:619–631.
- White, E.P., and S.D. Gehrt. 2001. Effects of recording media on echolocation data from broadband bat detectors. *Wildlife Society Bulletin* 29:974–978.
- Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.
- Wyoming Game and Fish Commission (WGFC). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. November.
- Wyoming Game and Fish Department (WGFD). 2013. Red Rim-Grizzly Wildlife Habitat Management Area. Wyoming Game and Fish Department, Cheyenne, WY. Available online at: <https://wgfd.wyo.gov/accessto/whmas/redgrizzly.asp>. July
- . 2010. Wyoming State Wildlife Action Plan. Wyoming Game and Fish Department, Cheyenne, WY.
- . 2005. A Comprehensive Wildlife Conservation Strategy for Wyoming. Wyoming Game and Fish Department, Cheyenne, WY. July.
- Wyoming Game and Fish Department (WGFD) and Bureau of Land Management (BLM). 1992. Memorandum of Understanding between State of Wyoming Game and Fish Commission and U.S. Department of the Interior Bureau of Land Management. Rawlins District for Development and Implementation of a Cooperative Management Plan for the Red Rim and Grizzly Cooperative Wildlife Habitat Management Areas.



This page intentionally left blank

# APPENDIX A

This page intentionally left blank



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
5353 Yellowstone Road, Suite 308A  
Cheyenne, Wyoming 82009



APR 20 2011

In Reply Refer To:  
ES-61411/WY11CPA0147

### Memorandum

To: Field Manager, Bureau of Land Management, Rawlins Field Office, Rawlins, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Avian Protection Plan Concurrence for the Sierra Madre-Chokecherry Wind Energy Project

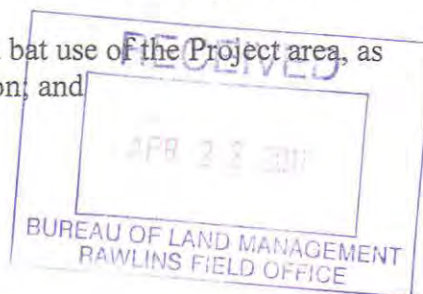
Thank you for your letter of December 9, 2011, regarding the proposed Power Company of Wyoming's (PCW) Sierra Madre-Chokecherry Wind Energy Project (Project). The proposed Project is located south/southwest of the city of Rawlins, Carbon County, Wyoming. The Project is a proposed 2,000-MW electrical generating facility consisting of up to 1,000 2-MW wind turbines.

You have requested that the U.S. Fish and Wildlife Service (Service) determine if an Avian Protection Plan (APP) is appropriate for this Project to minimize the potential "take" of eagles. Our response to your request is based on the two-step process identified in the Bureau of Land Management's (Bureau) Instruction Memorandum No. 2010-156 (IM-2010-156), which is:

- 1) The Service determines that developing an APP is an appropriate option for this Project to avoid and minimize the potential for golden eagle take; therefore, the Bureau's Authorized Officer may issue a Record of Decision approving the project; and
- 2) The Bureau's Authorized Officer shall not authorize a Notice to Proceed for this Project until the Service has evaluated the APP and determines that it is adequate.

Following the two-step process, we have determined that developing an APP is an appropriate option to avoid and minimize the potential take of eagles (based on the Bureau's IM-2010-156), and migratory birds and bats based on PCW's commitment to meeting the following criteria:

- a) Three years of surveys evaluating eagle, migratory bird and bat use of the Project area, as per Service guidance, conducted prior to Project construction; and





- b) Turbine numbers and layout are adjusted to provide effective buffers for eagle and other raptor nest sites as well as areas with high bird and bat utilization, as evidenced by the survey data.

To avoid and minimize impacts to migratory bird species protected by the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, as well as eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act), 16 U.S.C. 668, the APP will need to address all migratory bird species. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed even if all reasonable measures to protect them are used. The Service's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. It is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the OLE focuses its resources on investigating individuals and companies that take migratory birds without regard for their actions or without following an agreement to avoid take.

We advise the Bureau's Authorized Officer to not authorize a "Notice to Proceed" until the completed APP is delivered to the Service for evaluation and the Service determines the APP is adequate as documented in formal correspondence. The Service's determination as to the adequacy of the APP will depend upon the quality of the survey results used to develop the APP, how survey information was used to design a project layout that minimizes impacts, and how conservation measures will be applied during construction and operation.

We suggest that a programmatic APP, containing conservative conservation measures (e.g., no turbines within 4 miles of a golden eagle nest), be developed initially to provide guidance in lieu of area-specific information. This APP should be incorporated into the Project's Environmental Impact Statement (EIS). Any subsequent Project phases that rely upon an Environmental Assessment, which tiers to the EIS, will also form the basis for an individual Plan of Development (POD) APP. We expect that site-specific PODs will have higher levels of information about bird use, and their APP can be tailored to each specific area. We caution that it may not be reasonable to expect that the entire Project area can be developed (e.g., some Project areas may not be suitable for construction and should remain undeveloped).

The Service appreciates the Bureau's efforts to conserve golden eagles, other migratory birds, and bats in Wyoming. If you have questions regarding this letter or the MBTA and the Eagle Act, please contact Travis Sanderson of my staff at the letterhead address or phone (307) 328-4333.

cc: BLM, High Desert District Manager, Rock Springs, WY (J. Ruhs)  
BLM, RECO Wildlife Biologist, Rawlins, WY (C. Morton)  
BLM, Project Manager, Rawlins, WY (P. Murdoch)  
BLM, RECO Project Manager, Cheyenne, WY (T. Engles)  
BLM, State RECO Manager, Cheyenne, WY (M. Valle)  
USFWS, Regional Energy Coordinator, Lakewood, CO (T. Modde)  
USFWS, Branch Chief Energy, Water, Climate, Lakewood, CO (P. Repp)  
USFWS, Chief, Branch of Conservation Planning Assistance, Washington, D.C (L. Bright)  
WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)  
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)

This page intentionally left blank

# APPENDIX B



This page intentionally left blank

**LIST OF MIGRATORY BIRD SPECIES THAT HAVE BEEN OBSERVED IN THE CCSM PROJECT  
SITE AND THEIR ASSOCIATED CONSERVATION STATUS.<sup>1</sup>**

<b>Species Group</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Conservation Status<sup>1</sup></b>
<b>Corvids</b>	American Crow	<i>Corvus brachyrhynchos</i>	
	Black-billed Magpie	<i>Pica hudsonia</i>	
	Clark's Nutcracker	<i>Nucifraga columbiana</i>	
	Common Raven	<i>Corvus corax</i>	
<b>Passerines</b>	American Goldfinch	<i>Spinus tristis</i>	
	American Robin	<i>Turdus migratorius</i>	
	Barn Swallow	<i>Hirundo rustica</i>	
	Bewick's Wren	<i>Thryomanes bewickii</i>	
	Black-capped Chickadee	<i>Poecile atricapillus</i>	
	Blue-gray Gnatcatcher	<i>Poliopitila caerulea</i>	
	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	
	Brewer's Sparrow	<i>Spizella breweri</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Brown-headed Cowbird	<i>Molothrus ater</i>	
	Chipping Sparrow	<i>Spizella passerina</i>	
	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	
	Common Yellowthroat	<i>Geothlypis trichas</i>	
	Dark-eyed Junco	<i>Junco hyemalis</i>	
	Dusky Flycatcher	<i>Empidonax oberholseri</i>	
	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	
	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	
	Gray-crowned Rosy-finch	<i>Leucosticte tephrocotis</i>	
	Green-tailed Towhee	<i>Pipilo chlorurus</i>	
	Hammond's Flycatcher	<i>Empidonax hammondi</i>	
	Hermit Thrush	<i>Catharus guttatus</i>	
	Horned Lark	<i>Eremophila alpestris</i>	
	House Finch	<i>Carpodacus mexicanus</i>	
	House Wren	<i>Troglodytes aedon</i>	
	Lark Bunting	<i>Calamospiza melanocorys</i>	WGFD-SGCN
	Lark Sparrow	<i>Chondestes grammacus</i>	
	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	
	Loggerhead Shrike	<i>Lanius ludovicianus</i>	USFWS-CC, BLM-S
	MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	
	Mountain Bluebird	<i>Sialia currucoides</i>	
	Mountain Chickadee	<i>Poecile gambeli</i>	

<sup>1</sup> Consistent with the scope of the Phase I BBCS, this table does not include eagles or greater sage-grouse.

Species Group	Common Name	Scientific Name	Conservation Status <sup>1</sup>
	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	
	Orange-crowned Warbler	<i>Oreothlypis celata</i>	
	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
	Rock Wren	<i>Salpinctes obsoletus</i>	
	Ruby-crowned Kinglet	<i>Regulus calendula</i>	
	Sagebrush Sparrow	<i>Artemisiospiza nevadensis</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Sage Thrasher	<i>Oreoscoptes montanus</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Savannah Sparrow	<i>Passerculus sandwichensis</i>	
	Say's Phoebe	<i>Sayornis saya</i>	
	Snow Bunting	<i>Plectrophenax nivalis</i>	
	Song Sparrow	<i>Melospiza melodia</i>	
	Swainson's Thrush	<i>Catharus ustulatus</i>	
	Townsend's Solitaire	<i>Myadestes townsendi</i>	
	Tree Swallow	<i>Tachycineta bicolor</i>	
	Vesper Sparrow	<i>Pooecetes gramineus</i>	
	Violet-green Swallow	<i>Tachycineta thalassina</i>	
	Warbling Vireo	<i>Vireo gilvus</i>	
	Western Kingbird	<i>Tyrannus verticalis</i>	
	Western Meadowlark	<i>Sturnella neglecta</i>	
	Western Wood-pewee	<i>Contopus sordidulus</i>	
	Wilson's Warbler	<i>Wilsonia pusilla</i>	
	Yellow Warbler	<i>Dendroica petechia</i>	
	Yellow-breasted Chat	<i>Icteria virens</i>	
	Yellow-rumped Warbler	<i>Dendroica coronata</i>	
Non-eagle Raptors, Owls, and Allies	American Kestrel	<i>Falco sparverius</i>	
	Burrowing Owl	<i>Athene cunicularia</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Cooper's Hawk	<i>Accipiter cooperii</i>	
	Ferruginous Hawk	<i>Buteo regalis</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Great Horned Owl	<i>Bubo Virginianus</i>	
	Merlin	<i>Falco columbarius</i>	WGFD-SGCN
	Northern Goshawk	<i>Accipiter gentilis</i>	BLM-S, WGFD-SGCN
	Northern Harrier	<i>Circus cyaneus</i>	
	Osprey	<i>Pandion haliaetus</i>	
	Peregrine Falcon	<i>Falco peregrinus</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Prairie Falcon	<i>Falco mexicanus</i>	USFWS-CC
	Red-tailed Hawk	<i>Buteo jamaicensis</i>	

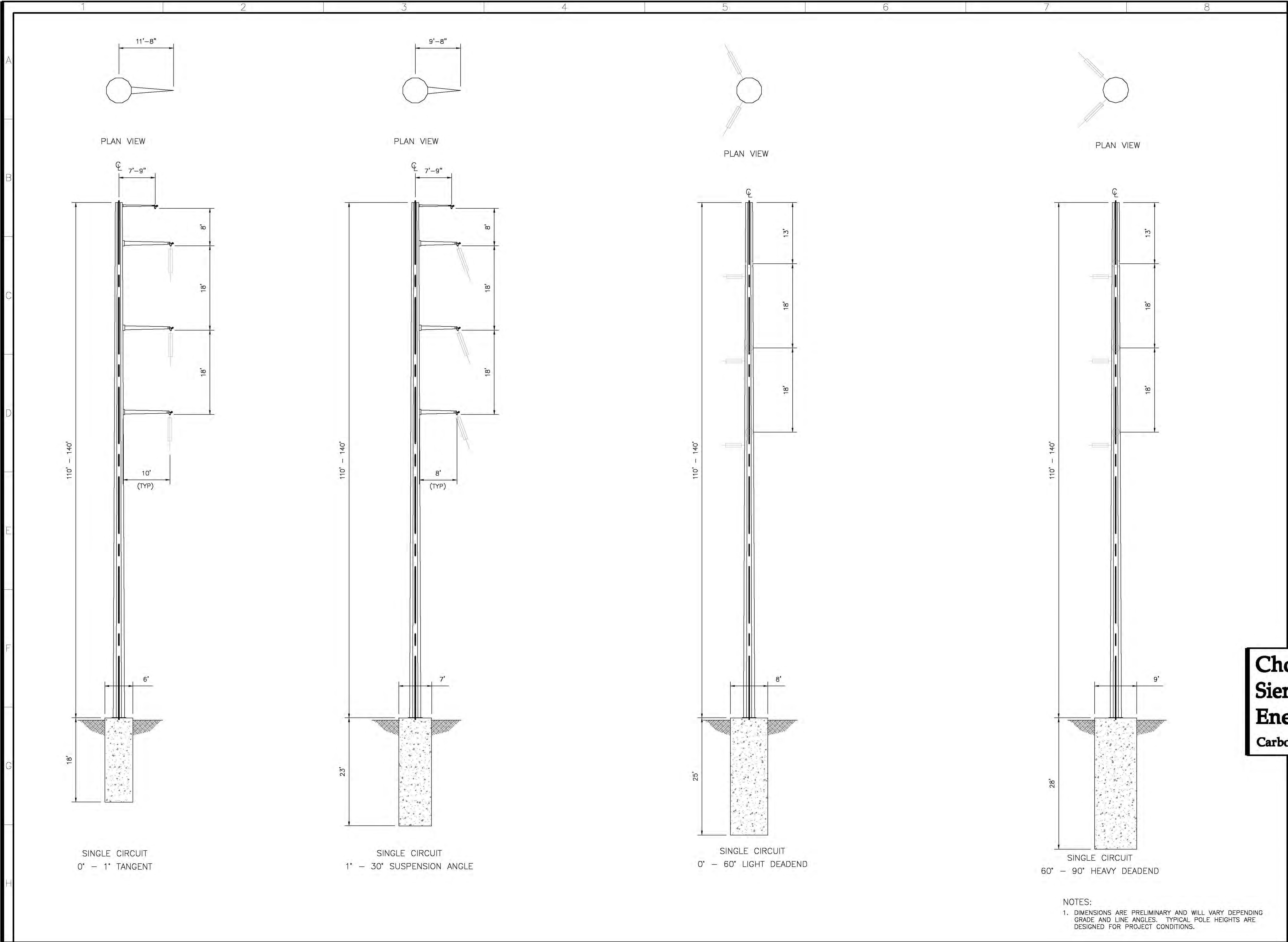
Species Group	Common Name	Scientific Name	Conservation Status <sup>1</sup>
	Rough-legged Hawk	<i>Buteo lagopus</i>	
	Sharp-shinned Hawk	<i>Accipiter striatus</i>	
	Swainson's Hawk	<i>Buteo swainsoni</i>	USFWS-CC, WGFD-SGCN
	Turkey Vulture	<i>Cathartes aura</i>	
Waterfowl, Waterbirds, and Wading Birds	American Avocet	<i>Recurvirostra americana</i>	
	American Coot	<i>Fulica americana</i>	
	American White Pelican	<i>Pelecanus erythrorhynchos</i>	
	American Wigeon	<i>Anas americana</i>	
	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	WGFD-SGCN
	Bufflehead	<i>Bucephala albeola</i>	
	Canada Goose	<i>Branta canadensis</i>	
	Canvasback	<i>Aythya valisineria</i>	WGFD-SGCN
	Cinnamon Teal	<i>Anas cyanoptera</i>	
	Clark's Grebe	<i>Aechmophorus clarkii</i>	WGFD-SGCN
	Common Loon	<i>Gavia immer</i>	
	Common Merganser	<i>Mergus merganser</i>	
	Double-crested Cormorant	<i>Phalacrocorax auritus</i>	
	Eared Grebe	<i>Podiceps nigricollis</i>	
	Gadwall	<i>Anas strepera</i>	
	Great Blue Heron	<i>Ardea herodias</i>	
	Greater Scaup	<i>Aythya marila</i>	
	Greater Yellowlegs	<i>Tringa melanoleuca</i>	
	Green-winged Teal	<i>Anas crecca</i>	
	Horned Grebe	<i>Podiceps auritus</i>	
	Killdeer	<i>Charadrius vociferus</i>	
	Least Sandpiper	<i>Calidris minutilla</i>	
	Lesser Scaup	<i>Aythya affinis</i>	WGFD-SGCN
	Lesser Yellowlegs	<i>Tringa flavipes</i>	
	Long-billed Curlew	<i>Numenius americanus</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Mallard	<i>Anas platyrhynchos</i>	
	Marbled Godwit	<i>Limosa fedoa</i>	
	Mountain Plover	<i>Charadrius montanus</i>	USFWS-CC, BLM-S, WGFD-SGCN
	Northern Pintail	<i>Anas acuta</i>	WGFD-SGCN
	Northern Shoveler	<i>Anas clypeata</i>	
	Pied-billed Grebe	<i>Podilymbus podiceps</i>	
	Redhead	<i>Aythya americana</i>	WGFD-SGCN
	Ring-billed Gull	<i>Larus delawarensis</i>	
	Ring-necked Duck	<i>Aythya collaris</i>	



Species Group	Common Name	Scientific Name	Conservation Status <sup>1</sup>
	Ruddy Duck	<i>Oxyura jamaicensis</i>	
	Sandhill Crane	<i>Grus canadensis</i>	WGFD-SGCN
	Sora	<i>Porzana carolina</i>	
	Western Grebe	<i>Aechmophorus occidentalis</i>	
	White-faced Ibis	<i>Plegadis chihi</i>	BLM-S, WGFD-SGCN
	Willet	<i>Tringa semipalmata</i>	
	Wilson's Phalarope	<i>Phalaropus tricolor</i>	
	Wilson's Snipe	<i>Gallinago delicata</i>	
Other	Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	
	Common Nighthawk	<i>Chordeiles minor</i>	
	Common Poorwill	<i>Phalaenoptilus nuttallii</i>	
	Mourning Dove	<i>Zenaida macroura</i>	
	Northern Flicker	<i>Colaptes auratus</i>	
	Rufous Hummingbird	<i>Selasphorus rufus</i>	
	White-throated Swift	<i>Aeronautes saxatalis</i>	

# APPENDIX C

This page intentionally left blank



BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: AGR  
Checked: -  
Drawn: JBF  
Record Drawing by/date:

Revisions:	DATE	DESCRIPTION
#		

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

## Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

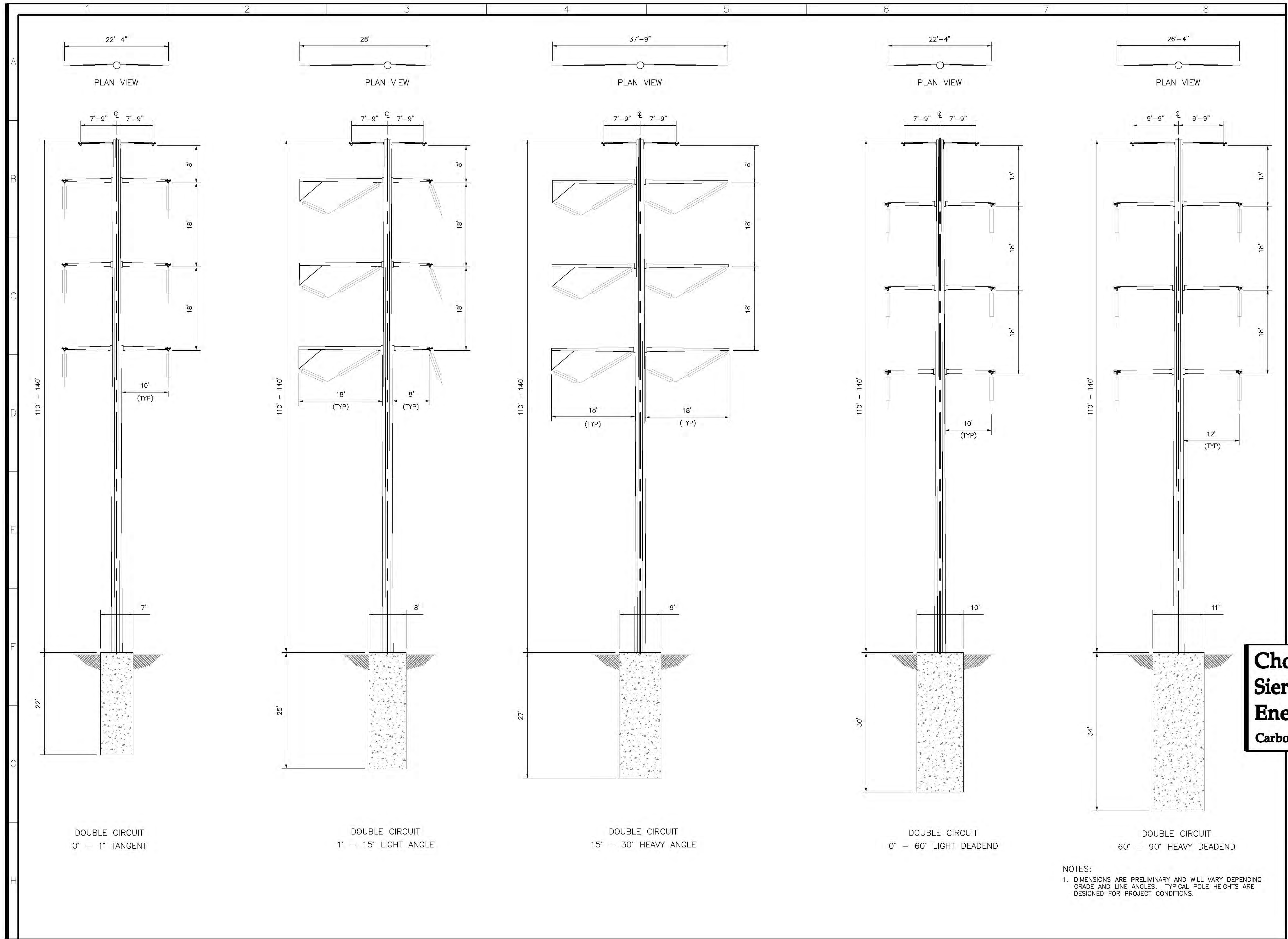
230KV Single Circuit  
Steel Pole Structures

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

NOTES:  
1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING  
GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE  
DESIGNED FOR PROJECT CONDITIONS.

Date: 01/05/15  
Sheet: 38 of 254





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed:	AGR	
Checked:	-	
Drawn:	JBF	
Record Drawing by/date:		
Revisions:		
#	DATE	DESCRIPTION
1	2	3

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

## Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

230KV Double Circuit  
Steel Pole Structures

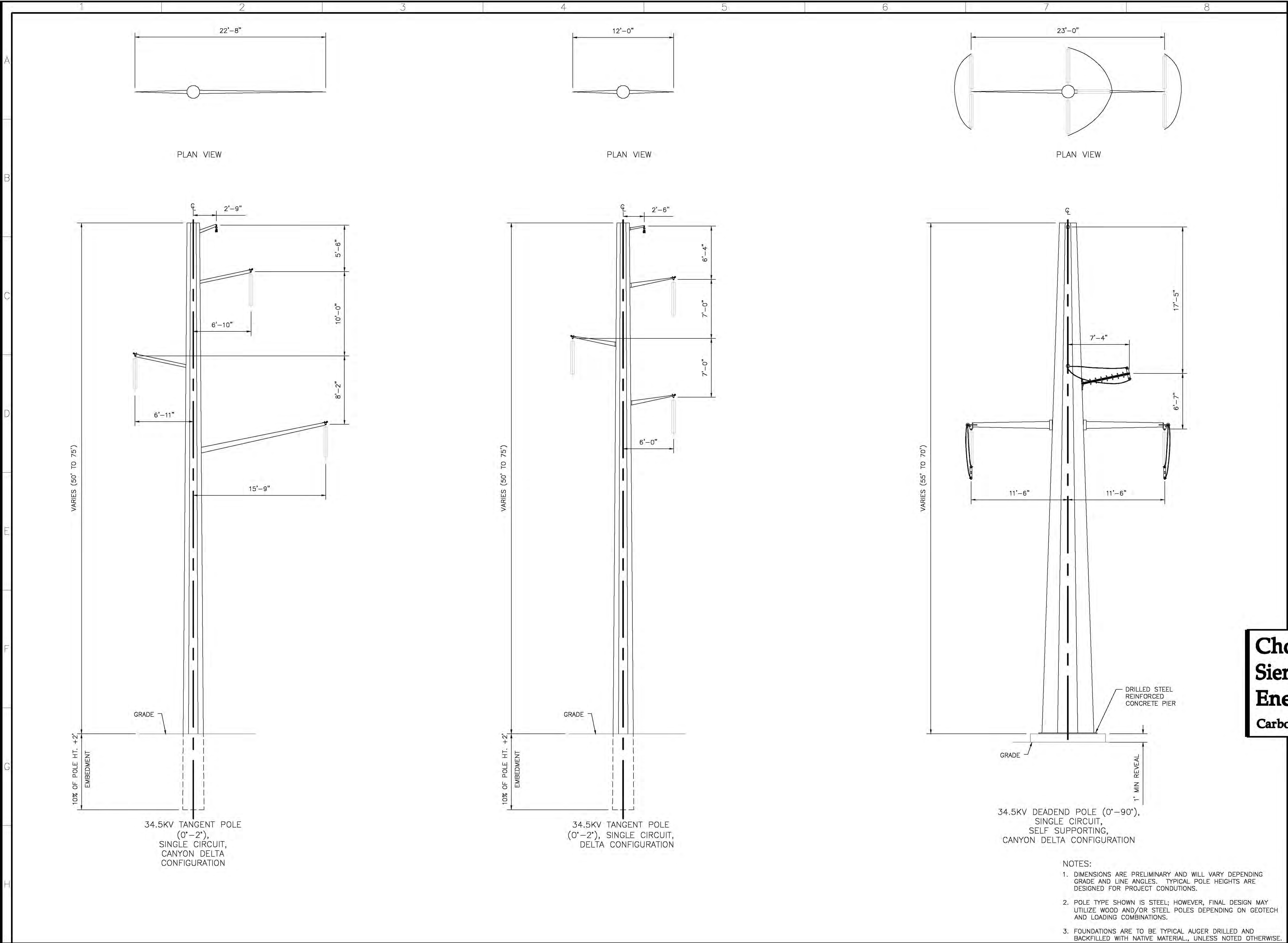
Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 39 of 254

NOTES:  
1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING  
GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE  
DESIGNED FOR PROJECT CONDITIONS.





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: ZAT

Checked: -

Drawn: JBF

Record Drawing by/date:

Revisions:  
# DATE DESCRIPTION



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

# Chokecherry and Sierra Madre Wind Energy Project Carbon County, Wyoming

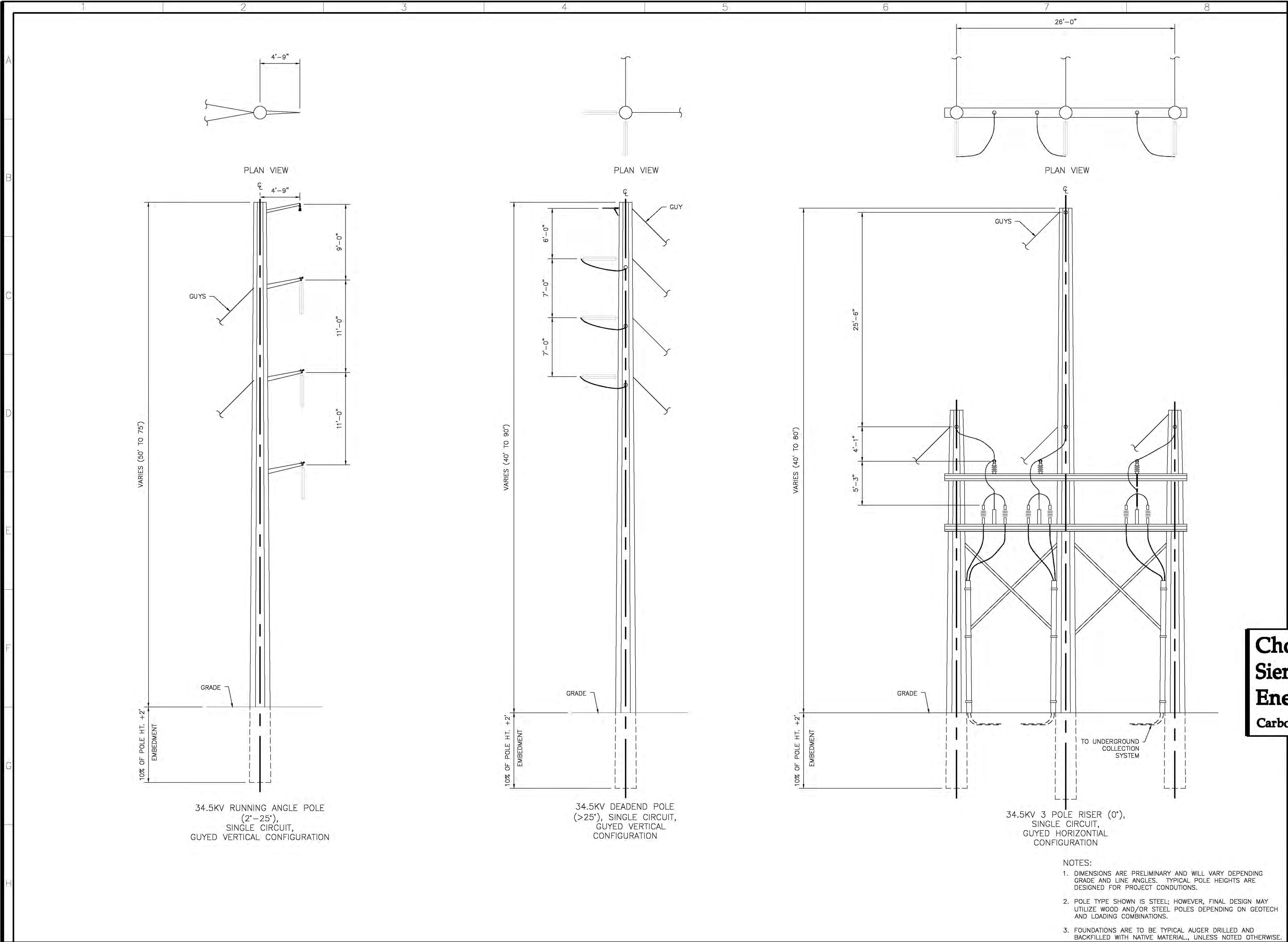
34.5KV Steel Single  
Circuit Pole Structures

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 44 of 254





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: ZAT  
Checked: -  
Drawn: JBF  
Record Drawing by/date:

Revisions:	DATE	DESCRIPTION
#		

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

# Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

34.5KV Steel Single  
Circuit Pole Structures

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 45 of 254

- NOTES:
- DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDITIONS.
  - POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
  - FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL, UNLESS NOTED OTHERWISE.





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: ZAT  
Checked: -  
Drawn: JBF  
Record Drawing by/date:

Revisions:	DATE	DESCRIPTION
#		

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

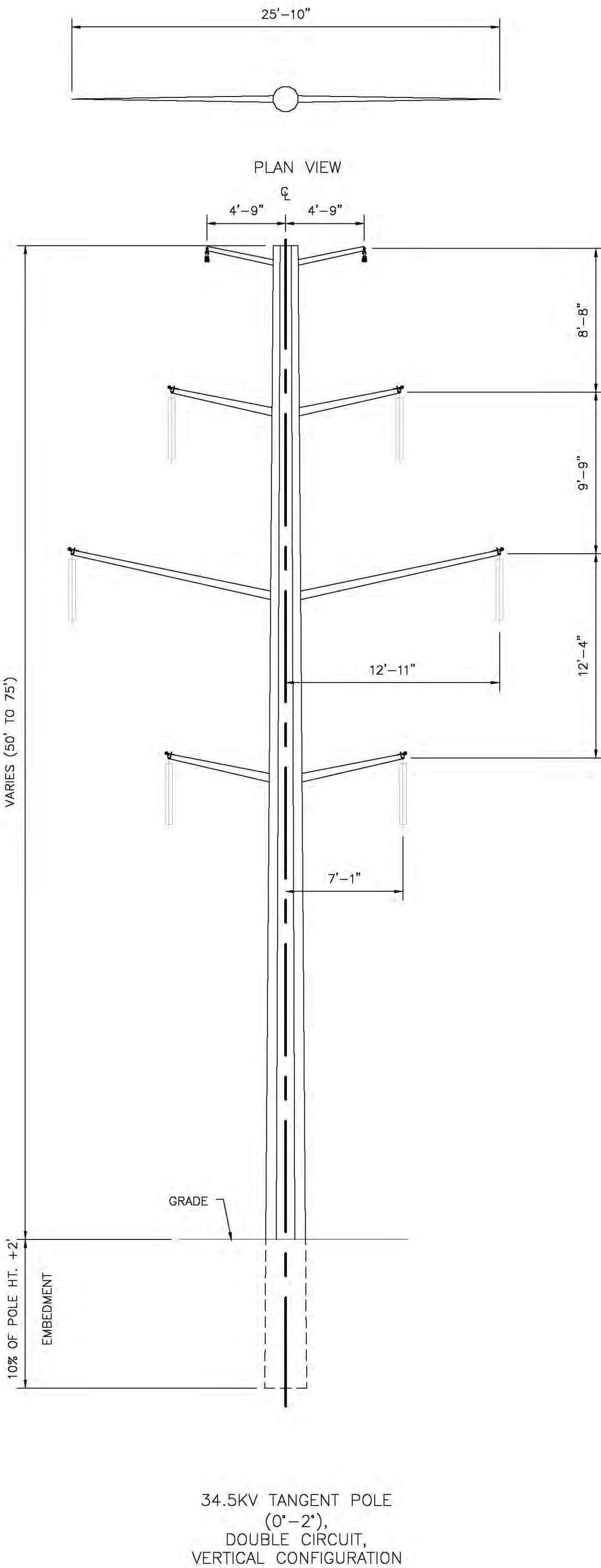
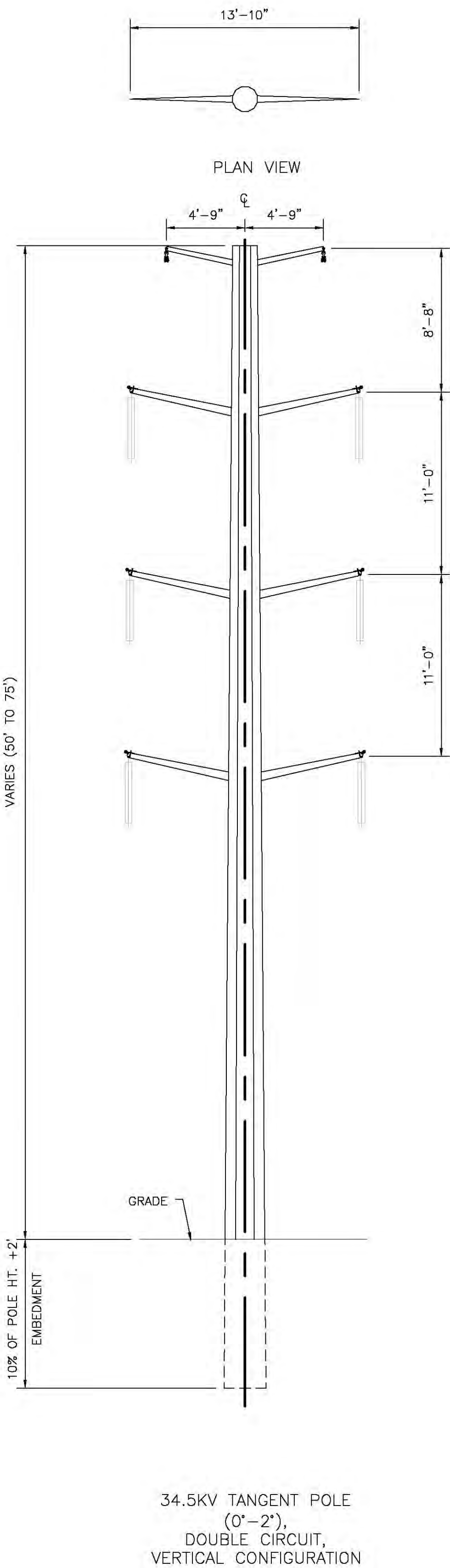
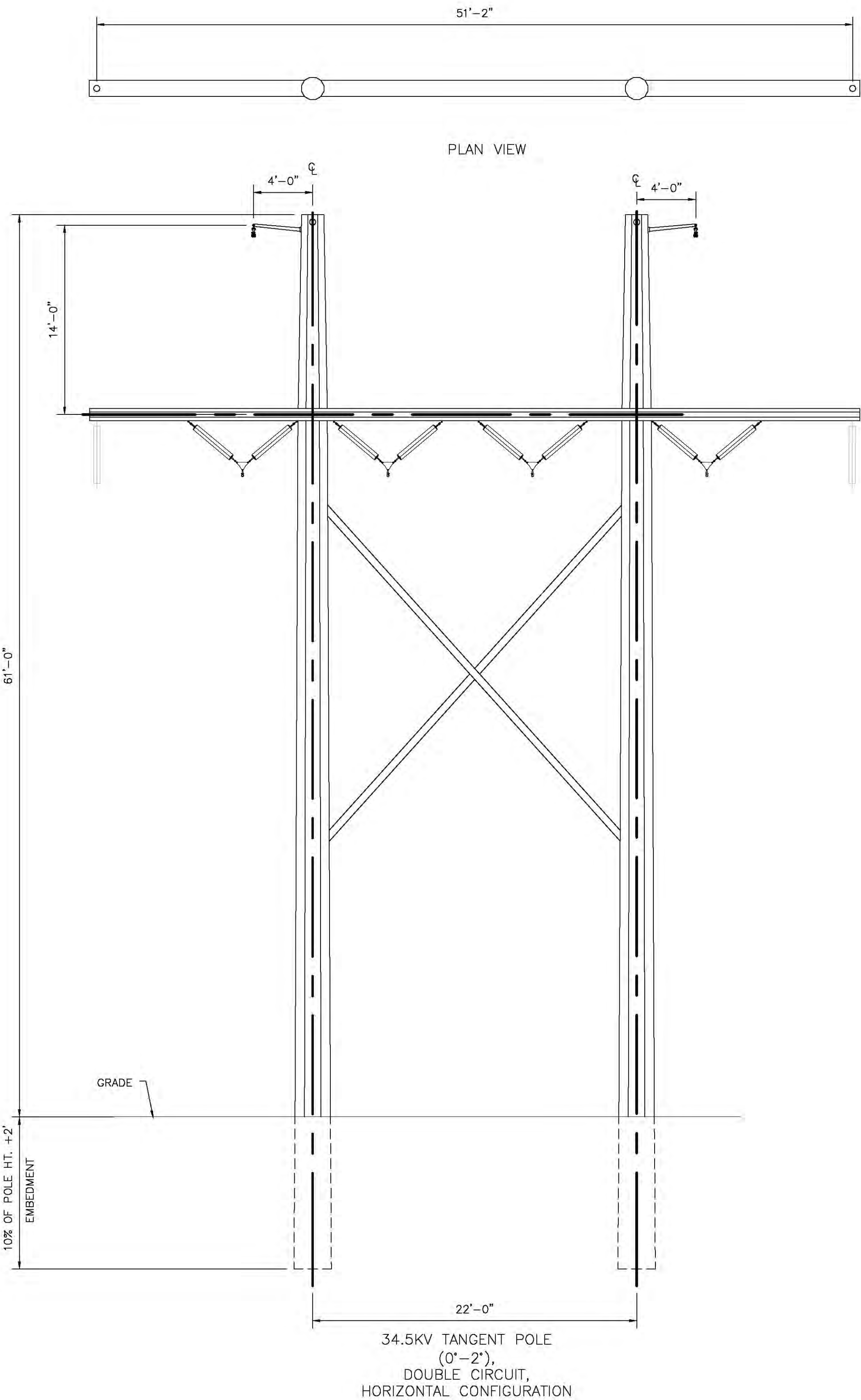
# Chokecherry and Sierra Madre Wind Energy Project Carbon County, Wyoming

34.5KV Steel Double  
Circuit Pole Structures

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

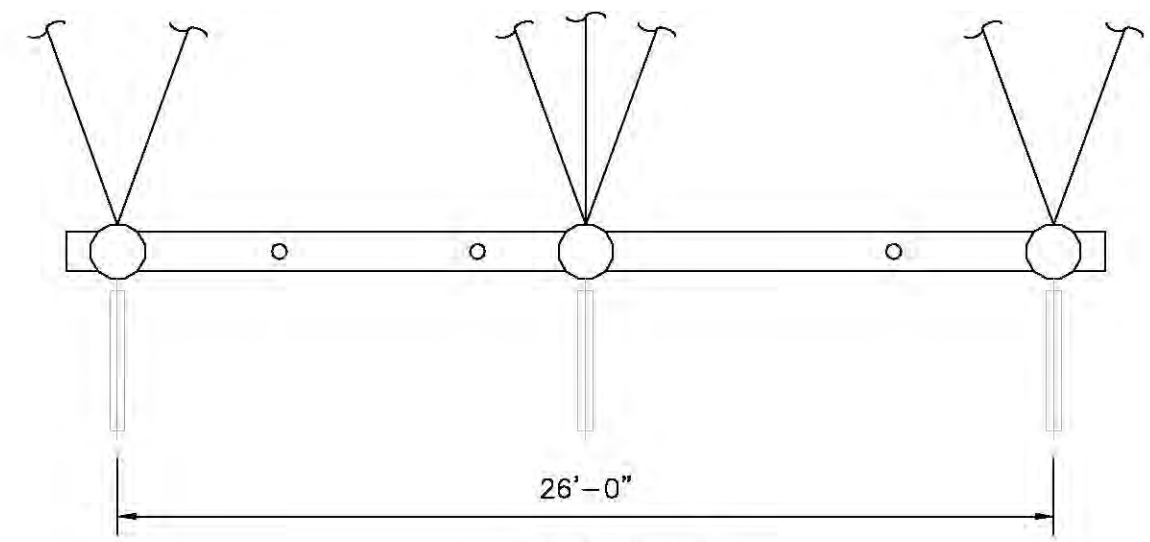
Date: 01/05/15

Sheet: 46 of 254

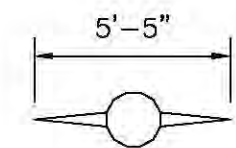


- NOTES:
- DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDITIONS.
  - POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
  - FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL, UNLESS NOTED OTHERWISE.

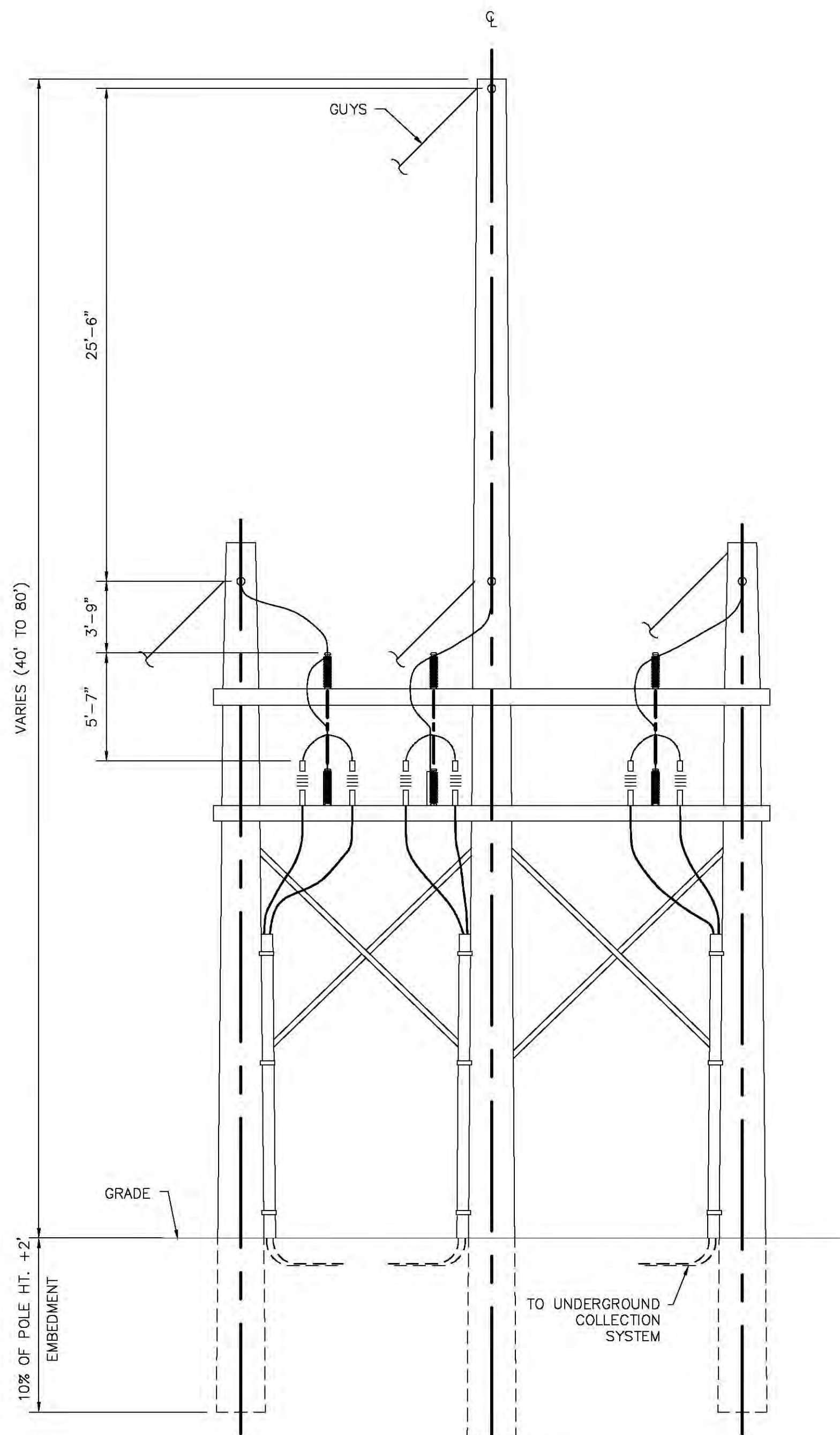




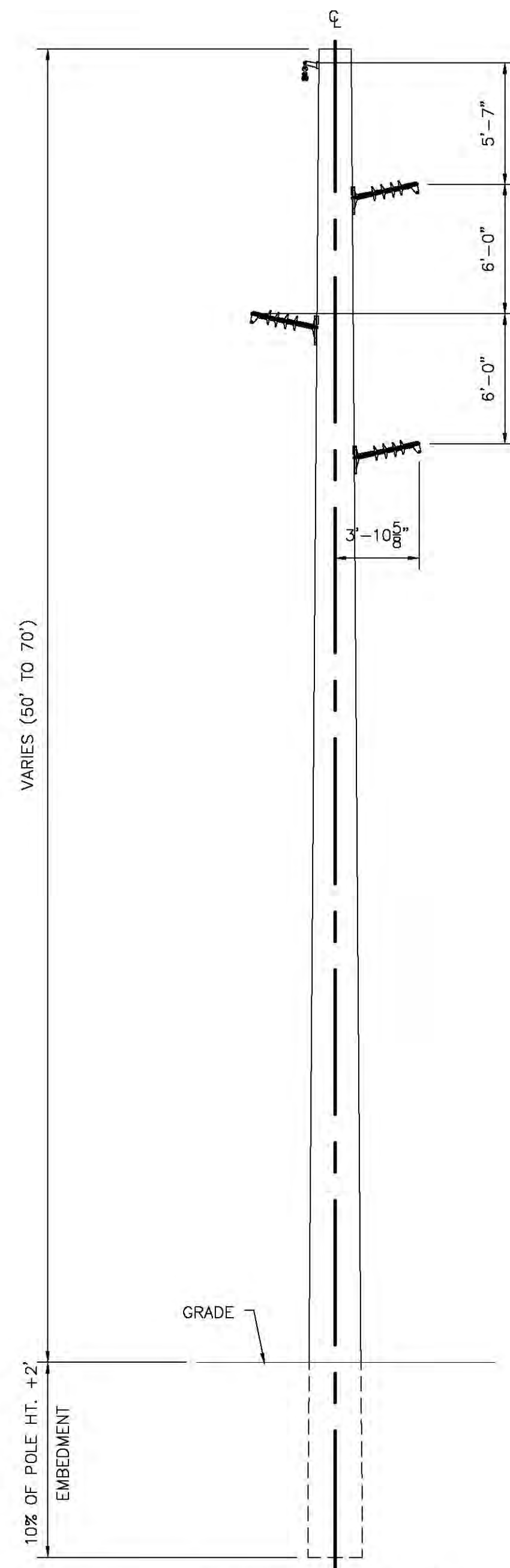
PLAN VIEW



PLAN VIEW



34.5KV 3 POLE RISER (0'),  
SINGLE CIRCUIT,  
GUYED HORIZONTAL  
CONFIGURATION



34.5KV TANGENT POLE  
(0'-2'), SINGLE CIRCUIT,  
DELTA CONFIGURATION

NOTES:

1. DIMENSIONS ARE PRELIMINARY AND WILL VARY DEPENDING GRADE AND LINE ANGLES. TYPICAL POLE HEIGHTS ARE DESIGNED FOR PROJECT CONDITIONS.
2. POLE TYPE SHOWN IS STEEL; HOWEVER, FINAL DESIGN MAY UTILIZE WOOD AND/OR STEEL POLES DEPENDING ON GEOTECH AND LOADING COMBINATIONS.
3. FOUNDATIONS ARE TO BE TYPICAL AUGER DRILLED AND BACKFILLED WITH NATIVE MATERIAL., UNLESS NOTED OTHERWISE.



BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: ZAT  
Checked: -  
Drawn: JBF  
Record Drawing by/date:

Revisions:	DATE	DESCRIPTION
#		

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

## Chokecherry and Sierra Madre Wind Energy Project

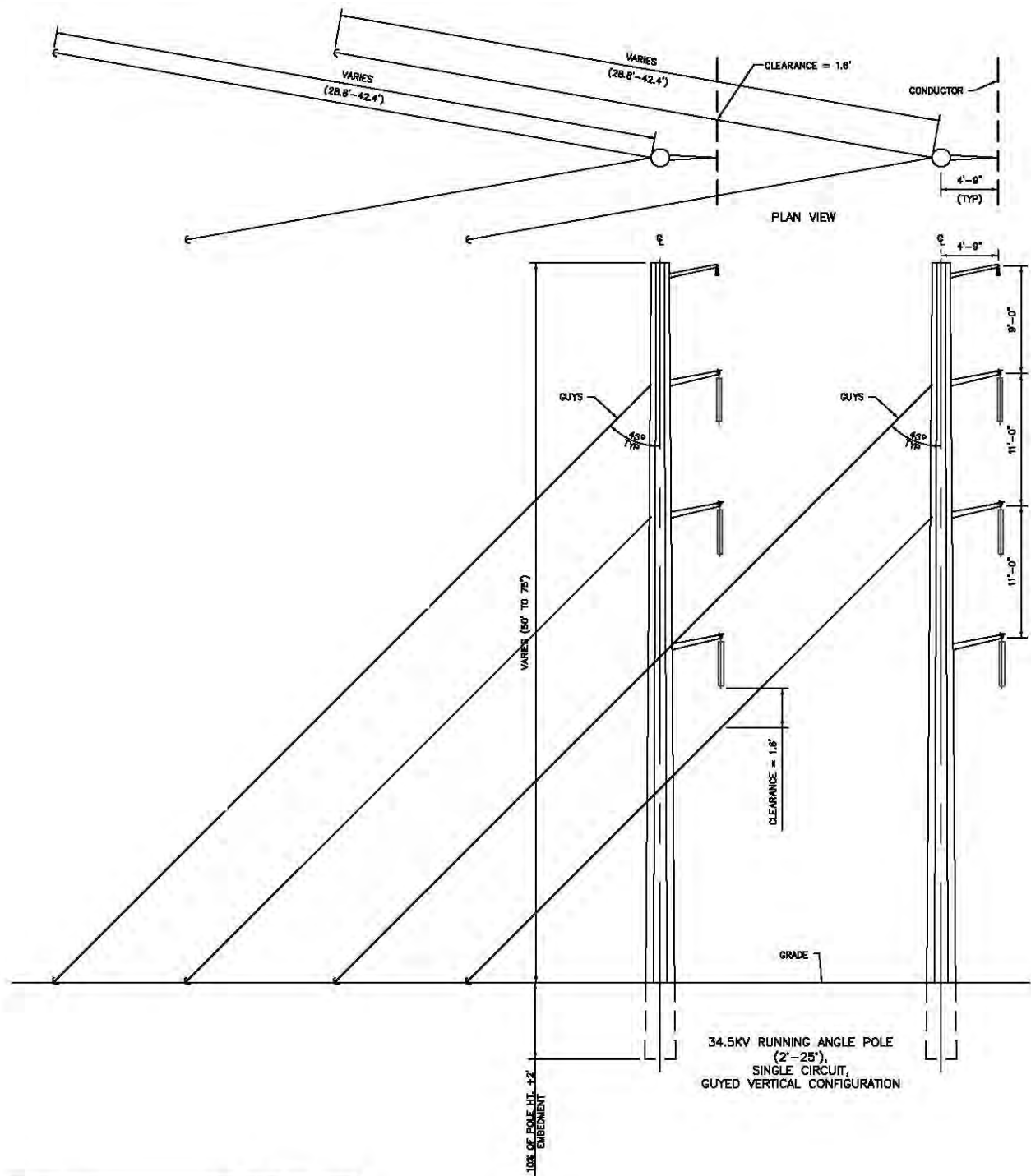
Carbon County, Wyoming

34.5KV Wood Single  
Circuit Pole Structures

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 47 of 254



CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	1.6'	9.9'
CONDUCTOR TO CONDUCTOR	7.0'	29.9'



**BLACK & VEATCH**  
Building a world of difference®

Black & Veatch Corporation  
Denver, Colorado

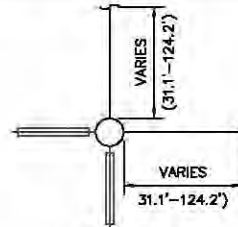
**34.5kV RUNNING ANGLE POLE  
DOUBLE CIRCUIT  
GUYED VERTICAL CONFIGURATION**

**CLEARANCE REFERENCE  
DRAWING**

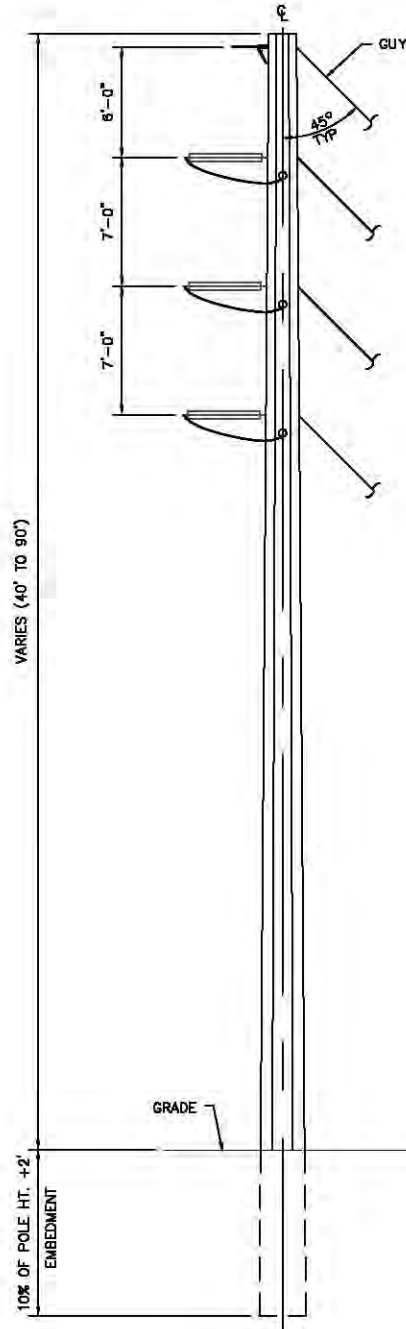
**7/24/15**

**Project No.  
185028**

**FIGURE 1**



PLAN VIEW



34.5KV DEADEND POLE  
(>25'), SINGLE CIRCUIT,  
GUYED VERTICAL  
CONFIGURATION

CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	1.7'	5.8'
CONDUCTOR TO CONDUCTOR	6.6'	29.9'



**BLACK & VEATCH**  
Building a **world** of difference®

Black & Veatch Corporation  
Denver, Colorado

**34.5kV DEADEND POLE  
SINGLE CIRCUIT  
GUYED VERTICAL CONFIGURATION**

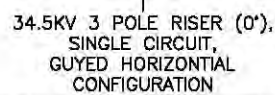
**CLEARANCE REFERENCE  
DRAWING**

**7/24/15**

**Project No.  
185028**

**FIGURE 2**





CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	5.2'	9.9'
CONDUCTOR TO CONDUCTOR	6.7'	29.8'



**BLACK & VEATCH**  
Building a **world** of difference®

**Black & Veatch Corporation**  
Denver, Colorado

**34.5kV 3 POLE RISER (0°)**  
**SINGLE CIRCUIT**  
**GUYED HORIZONTAL CONFIGURATION**

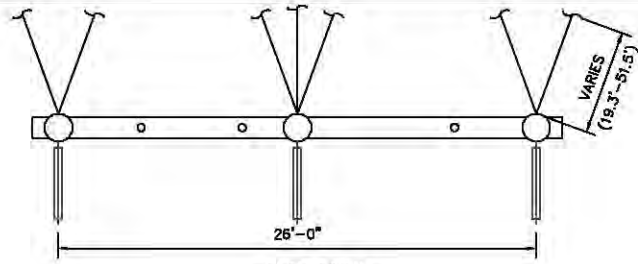
**CLEARANCE REFERENCE  
DRAWING**

7/24/15

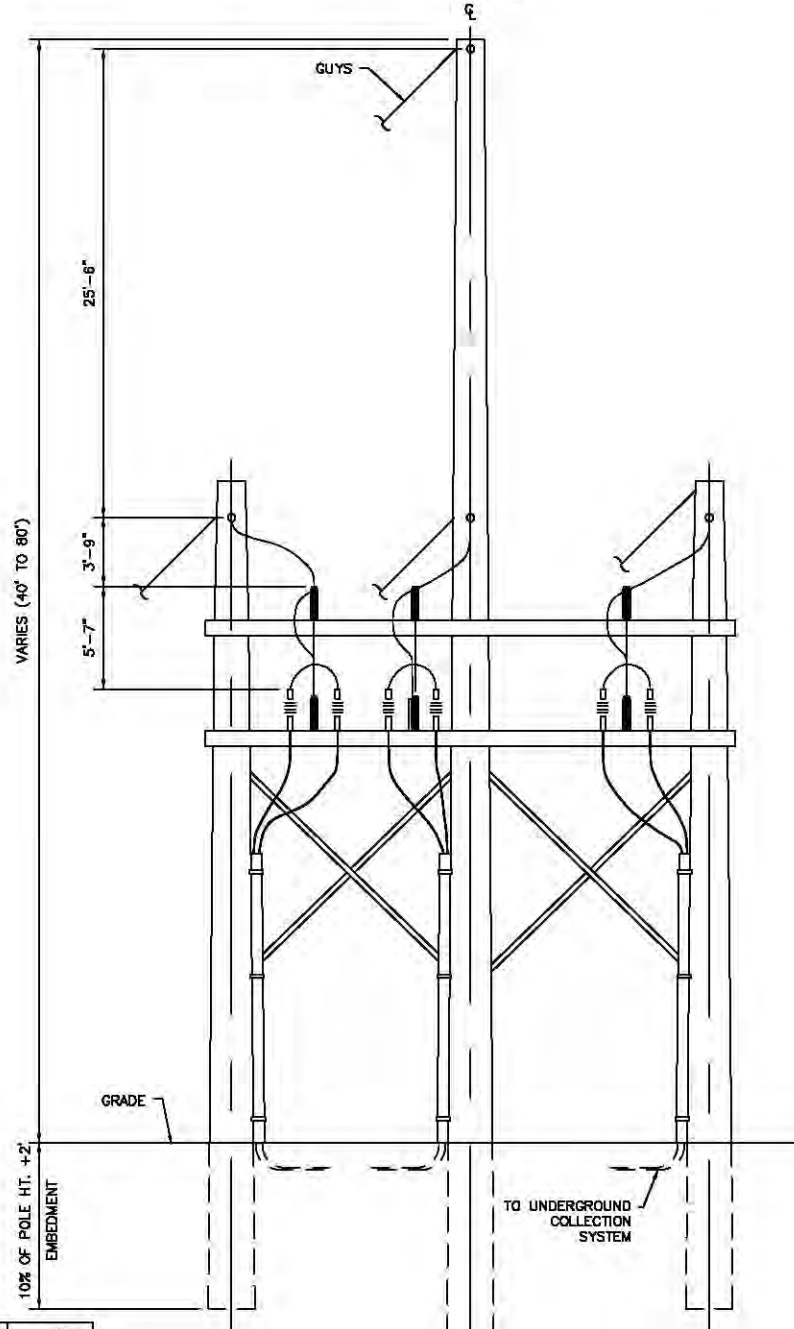
Project No.  
**185028**

**FIGURE 3**





PLAN VIEW



34.5kV 3 POLE RISER (0°),  
SINGLE CIRCUIT,  
GUYED HORIZONTAL  
CONFIGURATION

CLEARANCE	MIN (FT)	MAX (FT)
CONDUCTOR TO GUY	5.2'	9.9'
CONDUCTOR TO CONDUCTOR	6.7'	29.8'



**BLACK & VEATCH**  
Building a world of difference®

Black & Veatch Corporation  
Denver, Colorado

**34.5kV 3 POLE RISER (0°)**  
**SINGLE CIRCUIT**  
**GUYED HORIZONTAL CONFIGURATION**

**CLEARANCE REFERENCE  
DRAWING**

7/24/15

Project No.  
185028

**FIGURE 4**





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: AGR  
Checked: -  
Drawn: JBF  
Record Drawing by/date:

Revisions:	DATE	DESCRIPTION
#		

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

## Chokecherry and Sierra Madre Wind Energy Project

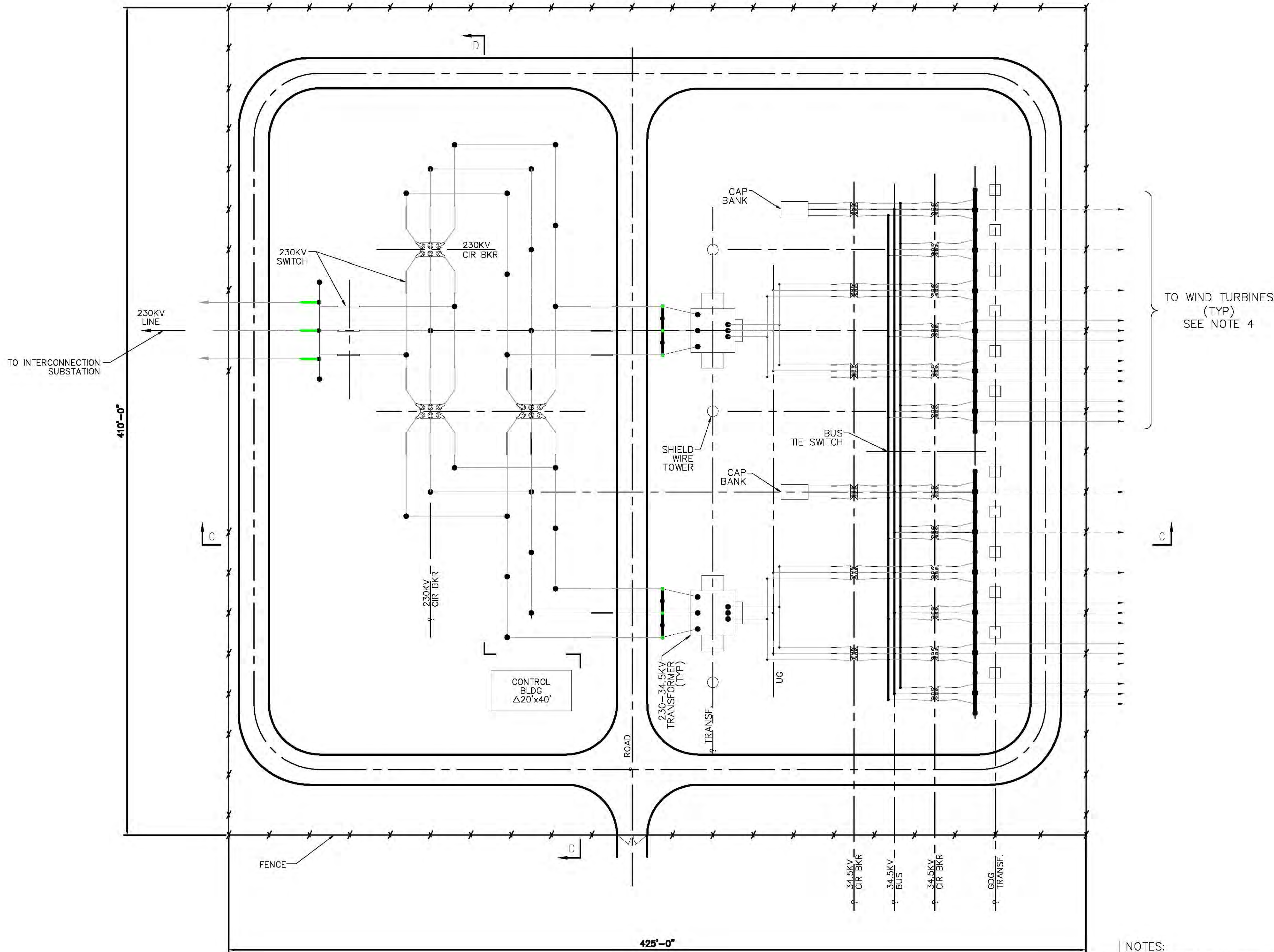
Carbon County, Wyoming

### 34.5/230KV Substation Plan View 2 Transformer Layout

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 42 of 254

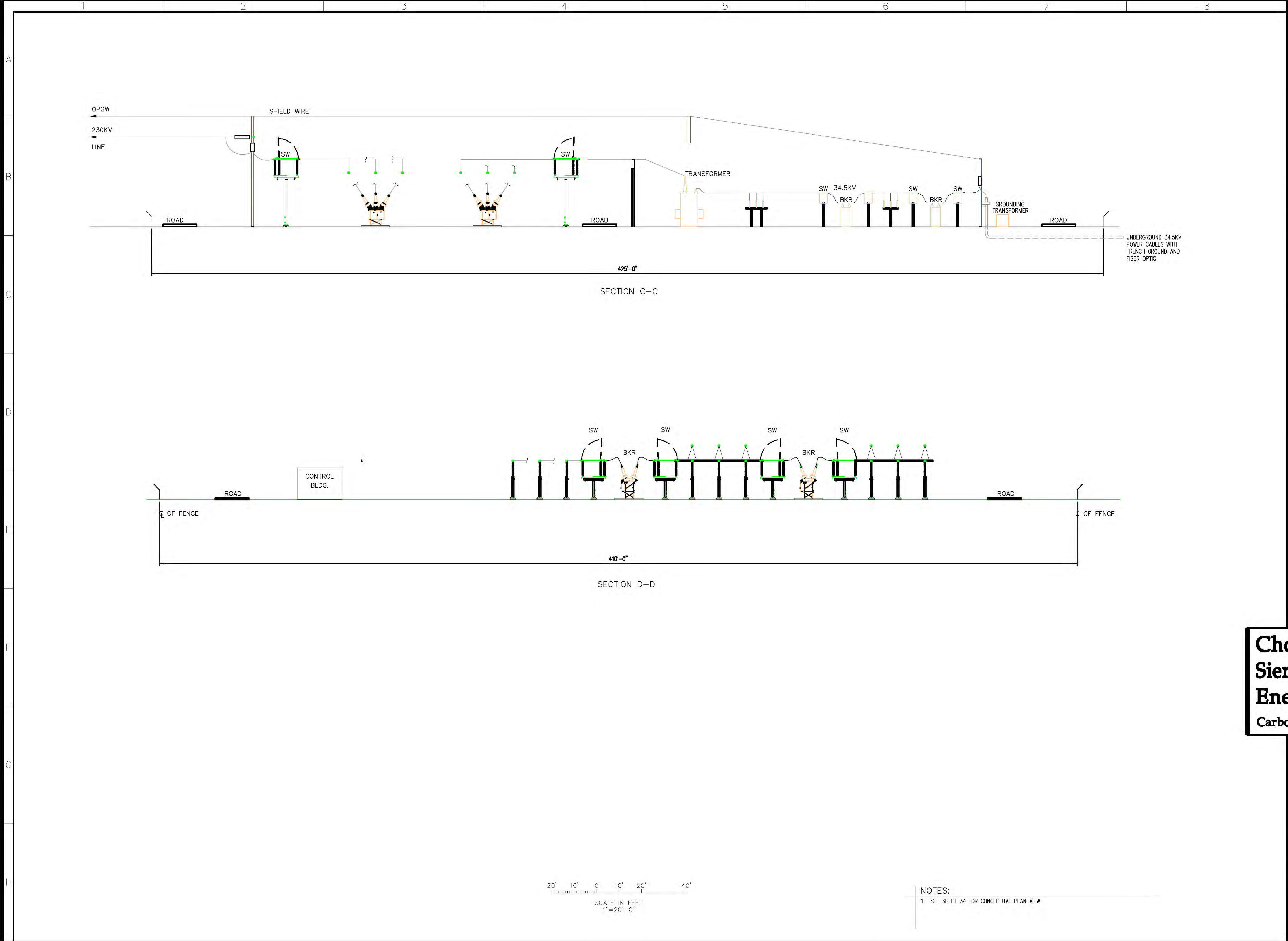


#### NOTES:

- THIS DRAWING IS PRELIMINARY AND INTENDED TO SHOW THE GENERAL SIZE AND DIMENSIONS OF A TYPICAL ARRANGEMENT BASED ON THE CURRENT CONCEPTUAL DESIGN.
- ACTUAL NUMBER OF 34.5KV CIRCUITS PER TRANSFORMER BANK COULD VARY BETWEEN 4-6 CIRCUITS. 6 CIRCUITS ARE SHOWN AS A CONSERVATIVE MEASURE.
- 34.5KV BUS CONFIGURATION IS PRELIMINARY. ACTUAL CONFIGURATION TO BE DETERMINED LATER BASED ON FINALIZED LAYOUTS, DESIGN PARAMETERS, AND OPERATIONS.
- 34.5KV CIRCUITS FROM WIND TURBINES WILL ENTER THE SUBSTATION AS AN OVERHEAD OR UNDERGROUND CIRCUIT. BOTH OVERHEAD AND UNDERGROUND ARRANGEMENTS ARE SHOWN ON THIS DRAWING.
- BUS TIE SWITCHES INTENDED TO BE NORMALLY OPEN. IN THE EVENT OF A XFMR FAILURE, THE BUS TIE SWITCH WOULD BE CLOSED TO MINIMIZE LOSS OF GENERATION. THIS SITUATION WOULD REQUIRE SPECIAL OPERATING PROCEDURES AND MAY REQUIRE SOME CURTAILING IN ORDER TO STAY WITHIN EQUIPMENT RATINGS.
- SEE SHEET 35 FOR CONCEPTUAL ELEVATION VIEWS.

30' 15' 0' 15' 30' 60'  
SCALE IN FEET  
1"=30'-0"





BLACK & VEATCH CORP.  
6300 S SYRACUSE WY  
SUITE 300  
CENTENNIAL CO, 80111

Designed: AGR

Checked: -

Drawn: JBF

Record Drawing by/date:

Revisions:

# DATE DESCRIPTION

Prepared for:



555 Seventeenth Street, Suite 2400  
Denver, CO 80202 USA

# Chokecherry and Sierra Madre Wind Energy Project

Carbon County, Wyoming

34.5/230KV  
Substation Elevation  
2 Transformer Layout

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

Date: 01/05/15

Sheet: 43 of 254



Designed: DK/KM  
Checked: RC/PC  
Drawn: KM/TR

Record Drawing by/date:

Revisions:  
# DATE DESCRIPTION

Prepared for:



# Chokecherry and Sierra Madre Wind Energy Project

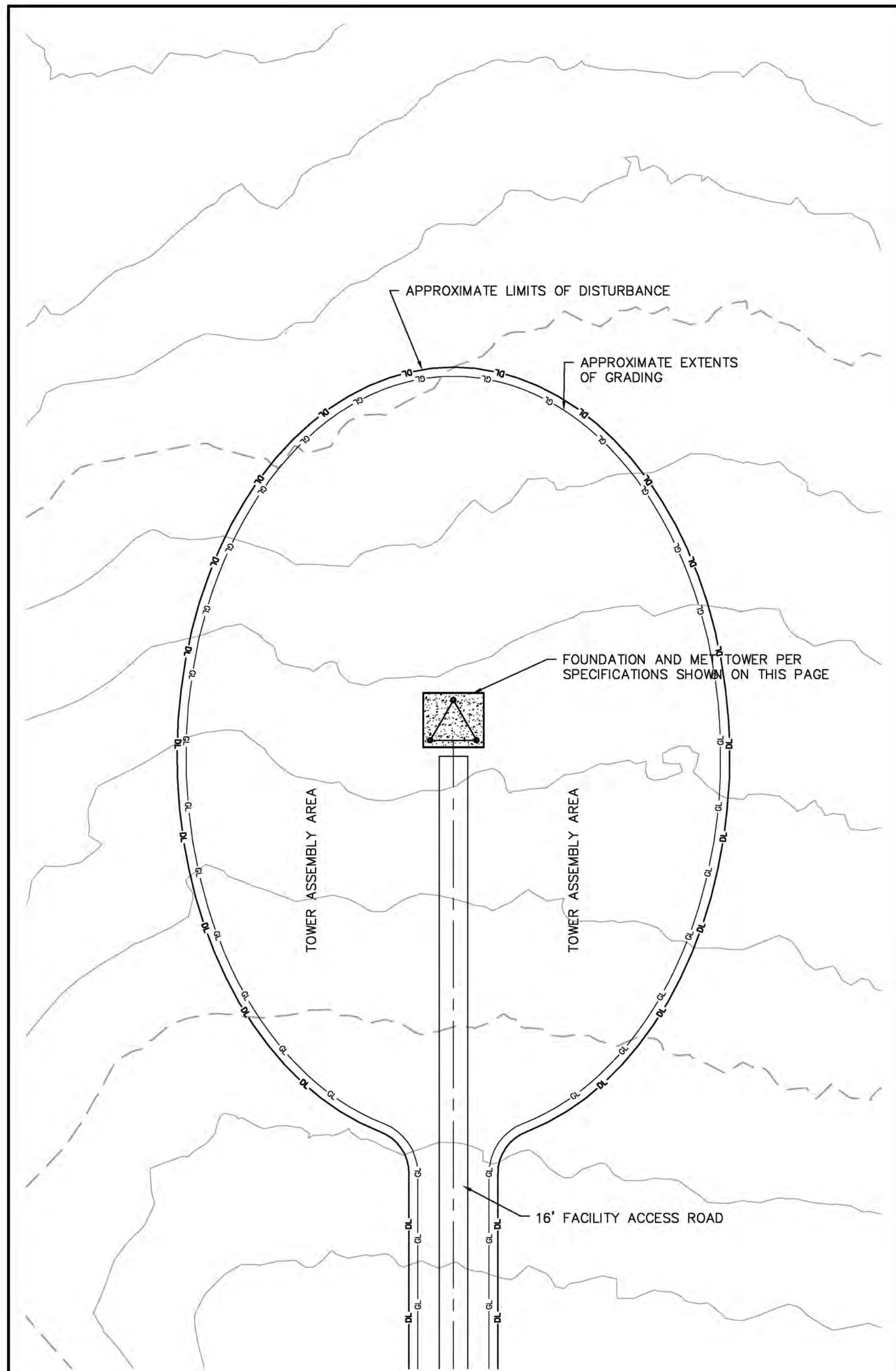
Carbon County, Wyoming

## Met Tower Details

Phase I Wind Development  
Area Wind Turbine Sites &  
Related Infrastructure  
**NOT FOR CONSTRUCTION**

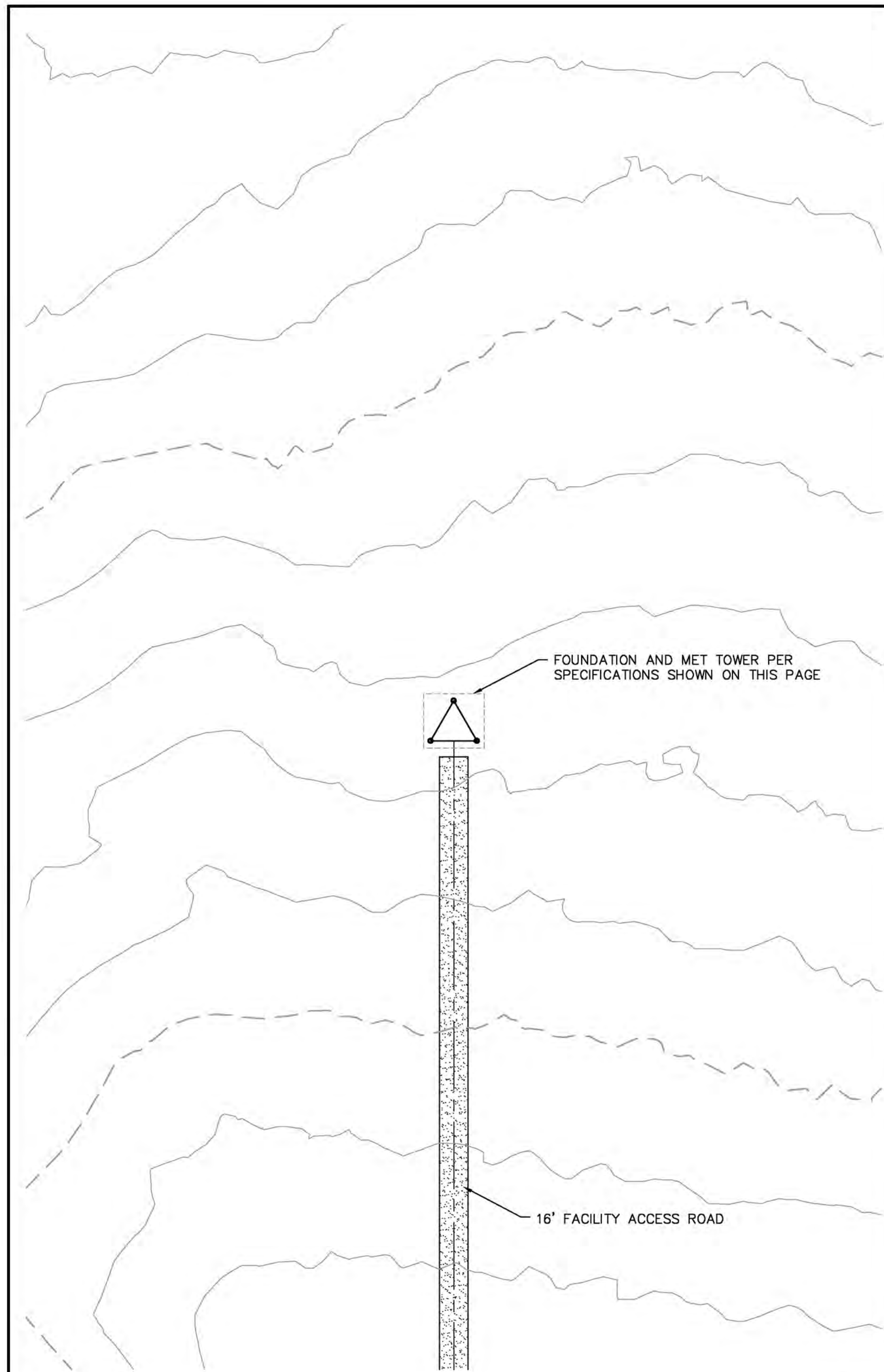
Date: 01/05/15

Sheet: 19 OF 254



TYPICAL MET TOWER SITE (DURING CONSTRUCTION)

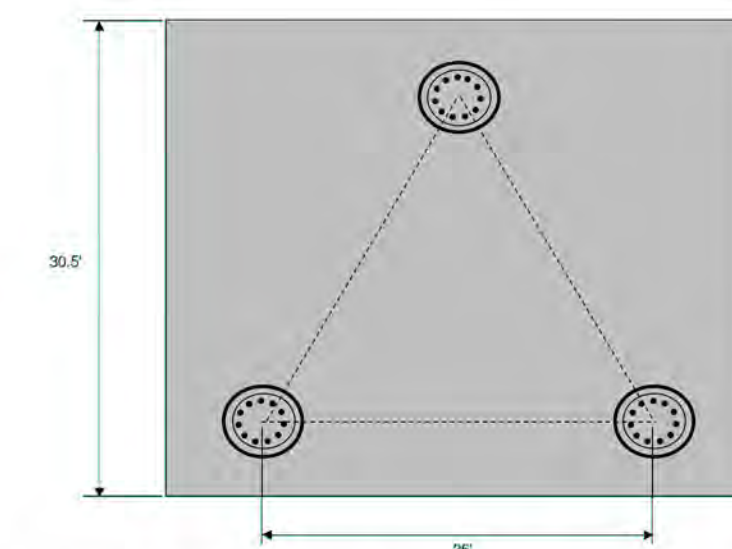
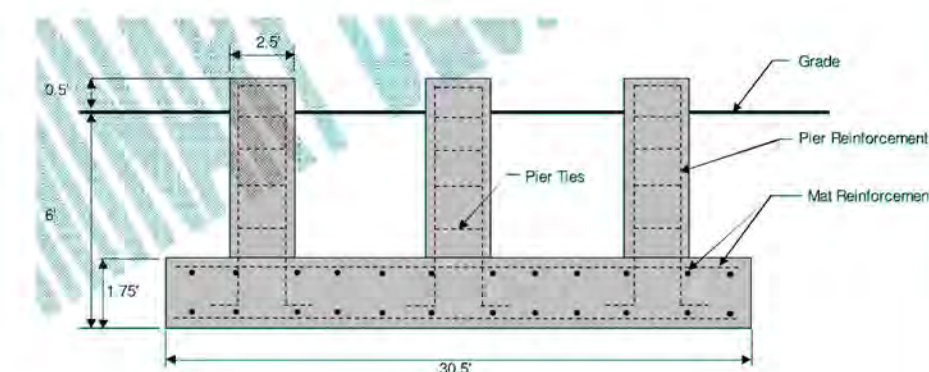
LAST REVISED:  
11/13/13  
TS16



TYPICAL MET TOWER SITE (POST CONSTRUCTION)

LAST REVISED:  
11/13/13  
TS17

Section	T17	T16	T15	T14	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	P8x322	P8x28	P5x258	P4x237	A500-50	P3 3x226	P2x154										
Leg Grade	L5x5x5/16	L4x4x1/4	L3 1/2x3 1/2x1/4	L3 1/2x3 1/2x1/4	L2 1/2x2 1/2x1/8	L2 1/2x2 1/2x1/8	L1 3/4x1 3/4x1/8										
Diagonals																	
Top Girts																	
Bottom Girts																	
Horizontals																	
Face Width (ft)	24	22	20	18	16	14	12.5	9.5	6.4	5	3.5						
# Panels @ (ft)			12 @ 10					16 @ 6.6667									
Weight (lb) 34801.4	8846.2	4886.9	3873.4	3234.6	2785.5	2527.6	1973.7	1314.3	888.3	623.6	405.3						



TOWER & FOUNDATION DESIGN PROVIDED BY:

<b>Nello Corporation</b> 211 W. Washington Street, Suite 2000 South Bend, IN 46601-1705 Phone: (574)288-3632 FAX: (574)288-5860	Job: <b>RFQ50164</b> Project: <b>JAWS Truewind</b> Client: <b>JAWS Truewind</b> Scale: <b>T/A-222-G</b> Date: <b>11/08/13</b> Drawn: <b>By: E-1</b>
---	--

DESIGNS PROVIDED ARE PRELIMINARY AND SUBJECT TO CHANGE.  
REFER TO FINAL PLANS FOR CONSTRUCTION INFORMATION.





# APPENDIX D

This page intentionally left blank

**Avian and Bat Monitoring Protocols  
for the  
Chokecherry and Sierra Madre Wind Energy Project**

Prepared for:

**Power Company of Wyoming, LLC  
555 17th Street, Suite 2400  
Denver, CO 80202**

Prepared by:

**SWCA Environmental Consultants  
295 Interlocken Blvd, Suite 300  
Broomfield, CO 80021  
303.487.1183 Fax: 303.487.1245  
[www.swca.com](http://www.swca.com)**

**March 2011**



This page intentionally left blank

## **Review of Agency Recommendations**

The following protocols have been developed in accordance with the following agency recommendations:

### **U.S. Fish and Wildlife Service (USFWS)**

Wind Turbine Guidelines Advisory Committee *Recommendations on Developing Effective Measures to Mitigate Impacts to Wildlife and Their Habitats Related to Land-Based Wind Energy Facilities* (USFWS 2010)

USFWS Draft Land-Based Wind Energy Guidelines (USFWS 2011a)

Draft Eagle Conservation Plan Guidance (USFWS 2011b)

### **Wyoming Department of Game and Fish (WGFD)**

*Wildlife Protection Recommendations for Wind Energy Development in Wyoming* (WGFD 2010)

### **Bureau of Land Management (BLM)**

Rawlins Field Office *Wildlife Survey Protocols for Wind Energy Development*,

Generally, USFWS survey recommendations (USFWS 2010, 2011a, and 2011b) include using standard sampling methods to determine avian use of a project area, fatality risk in a project area, the presence of sensitive species and other species of interest, and to provide a baseline for assessing displacement effects and habitat loss. USFWS recommends that sampling frequency, type, and duration be sufficient to account for variability of avian use between and within sampling periods. When more precise estimates of density are required for a special status species, other methods, including radar or nocturnal surveys have been recommended when risks for collision are expected.

Similarly, the Bureau of Land Management (BLM) Rawlins Field Office Wildlife Survey Protocols for Wind Energy Development recommends that surveys be sufficient to detect temporal and spatial use patterns within the project area. Special emphasis is placed on surveys for raptors and sensitive avian species. BLM survey protocols recommend weekly, 20-minute point counts to record avian use of a project area. Survey times are recommended to be varied weekly to ensure that avian use during daylight hours is adequately documented. In addition to weekly surveys, marine radar is recommended to better define avian foraging, dispersal, and migration paths.

Wyoming Game and Fish Department's (WGFD) Wildlife Protections Recommendations for Wind Energy Development in Wyoming recommend sufficient numbers of weekly point count surveys during spring and fall migration periods following similar protocols as specific by BLM with survey periods of twenty minutes at each point. WGFD recommends that four surveys be conducted during winter months to capture overwintering avian species. For raptor species, WGFD recommends nest surveys and weekly day-long surveys during spring and fall migration periods.

## Review of Existing Data

In compliance with its obligations under the National Environmental Policy Act of 1969 (NEPA), BLM is preparing an environmental impact statement (EIS) analyzing the potential impacts of the Chokecherry and Sierra Madre Wind Energy Project (Project) on lands and resources within the Project area. Between June 2008 and June 2009, avian use data were collected for much of the Project area as part of the BLM NEPA process [Johnson et al. 2008]. Data were collected using standard point count methods at 19 locations in all months except January and February when much of the Project area was inaccessible due to adverse weather conditions. All sites except for three were visited 31 times during the survey period.

WEST, Inc. (WEST) conducted avian point surveys of the Project area between June 26, 2008 and June 15, 2009. A portion of these data are analyzed in WEST's report, "*Baseline Avian Use Studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Summer and Fall Interim Report, June 26-October 14, 2008*" (Johnson et al. 2008). WEST also prepared a report summarizing bat surveys conducted between July 13 through October 13, 2008 titled, "*Bat Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Report*" (Solick et al. 2008). SWCA has completed additional analyses of all data collected in 2008 and 2009 to determine compliance with various agency monitoring recommendations.

Data collected during the 2008 and 2009 surveys are sufficient to provide estimates of avian use of the Project area as well as to provide initial estimates of the frequency of each species at rotor-swept heights. Horned lark (*Eremophila alpestris*) was predominantly the most common avian species detected in the 2008 and 2009 surveys, having over 800 individual detections. The next most common species were the common raven (*Corvus corax*) with less than 200 detections, and vesper sparrow (*Pooecetes gramineus*) with less than 150 detections. Golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), and common raven were most commonly observed within the rotary height of the turbines.

Data collected during 2008 and 2009 comply with the agency wind energy survey recommendations described in the previous section and serve as one year of suggested pre-construction monitoring data. Data collected for purposes of NEPA compliance provide estimates of collision and fatality risk and enable determination of avian use of the Project area, the presence of sensitive species and other species of interest, as well as providing a baseline for assessing displacement effects and habitat loss.

## Project-Specific Protocols

To supplement the 2008-2009 dataset and to better identify concentrated avian use areas for development of a Project-specific Avian Protection Plan (APP) and an Eagle Conservation Plan (ECP), an intensive one-year survey will be used to better identify avian use areas in the Project area. Protocols have been developed following the various agency recommendations discussed above and in coordination with local USFS, BLM, and WGFD biologists. The protocols are consistent with agency recommendations and will provide more detailed site-specific use data than the protocols individually recommended by any of the agencies.



A combination of avian radar, raptor count stations, standard grid sampling, and point count surveys will be used to determine avian use across the Project area with emphasis on large raptors including golden eagles. Avian radar technology has been identified by the BLM and USFWS as a desired method to map areas of high avian use. The sampling design will follow recommendations made by the USFWS, BLM, and WGFD by combining radar surveys with standard point count and breeding bird methodologies. The radar technology will also enable better identification of bat use areas and relative densities of bats in the Project area.

A DeTect Merlin Avian Radar System will be used to map avian use across the Project area. The DeTect Merlin radar system is a trailer-mounted system with a 200-watt horizontal solid-state S-band radar and a 10-kilowatt (kW) vertically operating X-band open array radar. The horizontal radar has a range of 2 to 5 miles in a 360-degree pattern around the unit. The vertical radar has a 24-degree beam width and detects flight paths 0.75 to 2.00 miles above the unit.

The avian radar system requires weekly maintenance and fueling and cannot be moved over extremely rough terrain on a regular basis. Additionally, the system will not differentiate between large raptors such as golden eagles and other large birds including geese, other large raptors, and possibly even ravens and; therefore, will be used in conjunction with field surveys to validate radar recorded data. However, the radar system, when coupled with point count verification of avian use, will allow for accurate horizontal and vertical mapping of avian use in the Project area. The radar system will also enable mapping of high use areas for bat species.

A combination of raptor and point surveys and breeding bird grid surveys will be conducted in concert with the radar survey. This design will provide intensive survey information regarding avian use patterns within the radar survey perimeter for each season. Raptor count stations, point counts, and breeding bird surveys will be used to validate the radar data and provide estimates of species-specific use patterns. Raptor stations and point count surveys will record the location, flight path, approximate height, and time of use for any individual observed from the count location. Raptor count locations will be surveyed for 8-12 hours per day during periods with the highest likelihood for detection of migrating birds and/or large raptors. Standard 20-minute point counts will be completed at each raptor count location. Timing of point count surveys at each location will be varied to determine patterns of avian use during daylight hours.

In addition to the raptor, point count, and radar surveys, breeding bird surveys will be completed at 15 locations across the Project area. Breeding bird surveys will be conducted following the grid monitoring protocols published by the Rocky Mountain Bird Observatory (RMBO) (Hanni et al. 2010). Grid survey locations will be randomly selected using a generalized random tessellation stratified design to ensure a spatially balanced design stratified by major vegetation and habitat types in the Project area. Data collected as part of the grid monitoring efforts will also be used to validate radar data and better determine avian species use. As part of the breeding bird surveys, waterfowl and water bird use surveys will be conducted three times annually (springs, summer, and fall) to identify migrating and resident species.

Locations for placement of the radar and for conducting point count surveys (Figure 1) and breeding bird surveys were determined using a four-tiered approach:

- Tier 1 – Survey areas should determine avian use within the Project area.

- Tier 2 – Survey areas should overlap possible foraging areas for large raptors (winter range areas, prairie dog towns, waterfowl use areas, etc.).
- Tier 3 – Survey areas should be in locations to allow for detection of avian movement into and out of the Project area.
- Tier 4 – Survey areas should capture variability in habitat and topography.

Locations of radar placement were refined following attendance at DeTect's radar training courses and during coordination with DeTect's radar placement specialists. Figure 1 reflects the revised radar locations. Final placement of the radar unit and final point locations for survey will be determined in early spring 2011 following radar unit delivery.

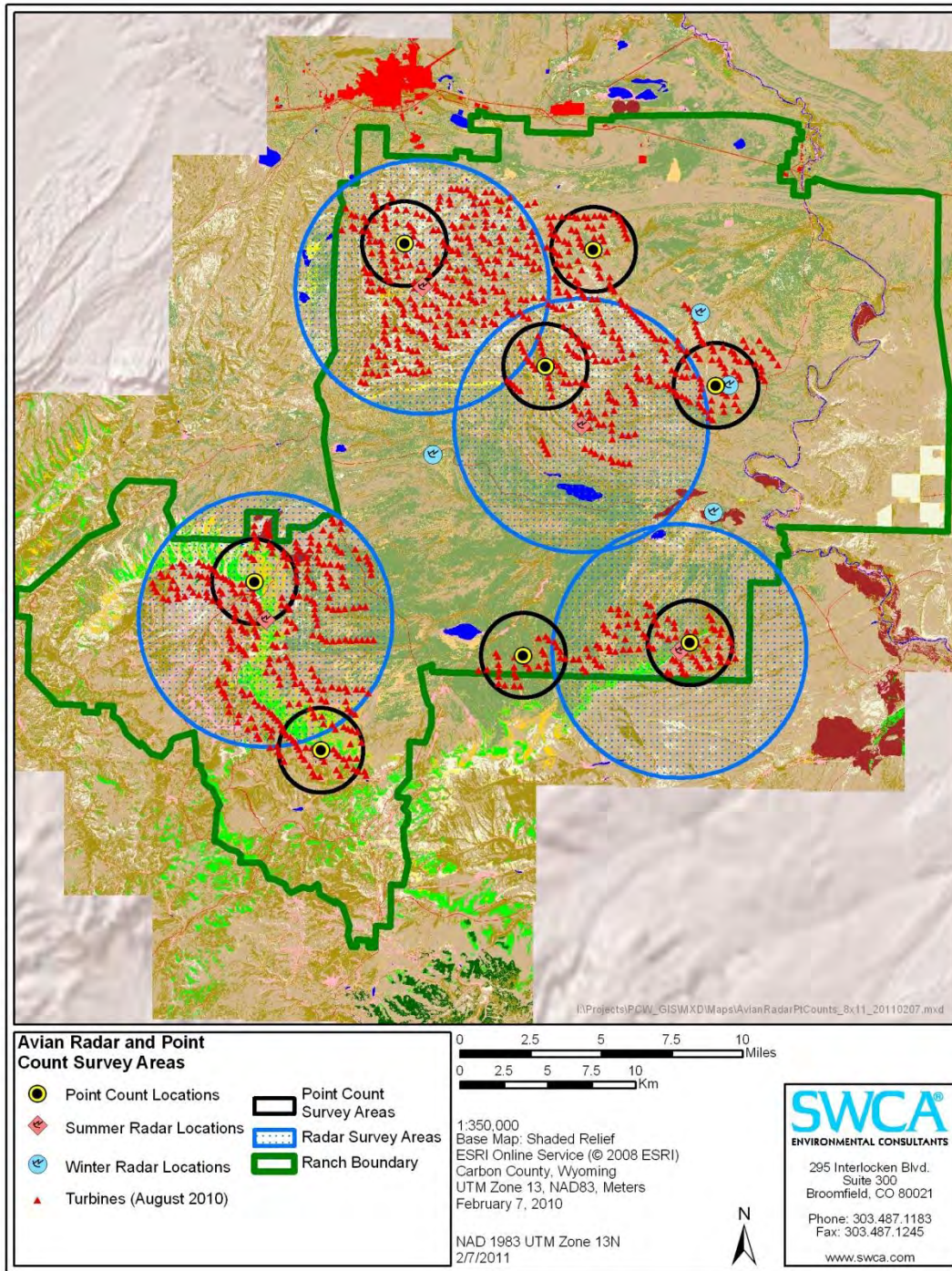


Figure 1. Approximation of area surveyed using avian radar and traditional point count methodologies with respect to possible wind turbine locations. Spring, summer, and fall radar installation locations are the center point of the large blue circles. Proposed point count locations are the center points of the small black circles. Potential winter radar locations are the four blue points. Final locations for survey will be determined in coordination with BLM, WGFD, and USFWS.



The radar unit will be placed at five locations within the Project area (Figure 1). Point counts will be completed at nine additional locations to map avian use patterns where radar coverage is not possible. Eight of these point counts will be completed at permanent sampling locations. The ninth point count location will be completed at the radar site to validate the data being collected by the radar unit. During winter months, the radar will be placed in a location that has high probability of access on a weekly basis. Much of the project area is covered in snow and large drifts during winter; therefore, radar placement in winter will likely be near the Bolton Ranch headquarters, south of I-80 near the North Platte River, on the Bolton Road east of Teton Reservoir, or on the north side of the Chokecherry project area (Figure 1). Winter point count survey locations will also be adjusted as needed to account for winter weather conditions, access issues, and safety concerns.

Based on a four mile radius for radar surveys and a one mile radius for point count surveys, approximately 90-93% of the turbine locations, depending on winter radar placement, will be directly surveyed. It is likely that this percentage is higher than 90-93% for large raptors including bald and golden eagles as many of the point count locations have visibility of several miles and recent radar advancements may allow for detection of large raptors out to 5+ miles. Point count locations outside of the radar survey perimeters have been placed to allow for detection of raptors moving into the Project area and between radar surveyed zones.

Helicopter flights will be completed in mid-April or early May to document eagle nesting activity as well as nesting activity of other raptors that are incidentally observed. Aerial nest activity surveys will be completed in accordance with the recent draft eagle guidance (USFWS 2011b). Following identification of active eagle nests, follow-up productivity surveys will be completed from the ground above/below the nest to determine nesting and fledging success.

The protocols and schedule outlined below will be followed for monitoring and mapping avian and bat use across the Project area using the marine radar system, point counts, and breeding bird surveys.

1. Winter 2010/2011 – Radar construction, programming, and training. The Draft APP/ECP will be delivered to USFWS, BLM, and WGFD for review in late winter/early spring. Among other descriptive sections, the preliminary plan will contain the detailed sampling protocols, preliminary mitigation and avoidance measures, and detailed adaptive management protocols. Monthly reconnaissance surveys will be completed to document eagle use of the Project area during winter months and to help determine best locations for winter 2011/2012 deployment of the radar system.
2. Spring and Early Summer 2011 – Radar surveys will begin in the southern portion of the Project area. The radar system will be moved once during the spring migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Breeding bird surveys will be completed at 15 locations across the Project area. Surveys for waterfowl and other waterbirds will be conducted once during the spring migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data will be

used to identify areas with high avian and bat use. The following schedule will be used for spring and early summer 2011 surveys:

- a. March 15 – May 15, 2011: Radar system will be initialized and debugged prior to main migratory period. Initial installation will occur at the southeastern-most radar survey location identified on Figure 1. This survey location will detect migrating birds in areas adjacent to the Platte River corridor and along the ridgeline north of the Jack Creek road. Weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.
  - b. May 15–July 31, 2011: Radar system will be moved to the northeastern survey location (Figure 1). This survey location will detect migrating birds adjacent to and along the Bolten Rim as well as in the basin below the Bolten Rim. Migratory use and raptor soaring locations within and adjacent to the ridgelines in this portion of Chokecherry will also be surveyed using the radar system. Between May 15 and June 30, weekly point surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location. During the month of July, the point count locations will be visited twice instead of every week in compliance with BLM and WGFD recommendations. Additionally, this time is between migratory periods and typically bird movements are lower because of nesting activities. A point count will be conducted weekly at the radar installation location during this period during routine maintenance activities.
  - c. May 25–June 30, 2011: Breeding bird surveys will be completed once at each of 15 locations across the Project area to determine relative abundance, species richness, and habitat use patterns. Breeding bird surveys will follow RMBO grid survey protocols (Hanni et al. 2010). Bird flight patterns will be documented to better define risks of wind development activities. All raptors as well as their flight paths and heights will be recorded at all breeding bird locations regardless of whether the raptor falls within the grid survey area.
  - d. May 1, 2011: An agency meeting will be scheduled to discuss preliminary analyses of radar data from early spring migration to allow for more informed use of the radar and survey data that will be used in the APP/ECP.
3. Late Summer – Fall 2011: The radar system will be moved once during the fall migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Waterfowl and wading bird surveys will be conducted once during late summer to detect nesting activity and once during fall migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data collected during spring and early summer will be completed to evaluate bird and bat use and to identify appropriate mitigation measures that could be implemented. The following schedule will be used for late summer and fall 2011 surveys:

- a. August 1: A revised APP/ECP will be delivered to the agencies for review and approval. The revised APPECP will contain the mitigation measures that will be applied to remove or minimize risks to avian species. The revised APP/ECP will also identify the adaptive management process that will be followed to update the APP/ECP and apply additional site-specific mitigation measures as additional data are obtained prior to, during and after construction. An interim report of radar data trends and observations will also be provided with the revised APP/ECP.
  - b. August 1– September 30, 2011: Radar system will be installed at the western radar location in the Chokecherry project area radar survey location identified on Figure 1. This survey location will detect migrating birds in the western portion of Chokecherry as well as along the rim of Chokecherry and the basin between Chokecherry and Atlantic Rim. During the month of August, the point count locations will be visited twice instead of every week. A point count will be conducted weekly at the radar installation location during August as part of routine maintenance activities. During September, weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.
  - c. October 1–November 15, 2011: Radar system will be moved to a location along the rim of Miller Hill in the southwestern portion of the project area (Figure 1). This survey location will detect birds in the Miller Hill area and below the Miller Hill rim in the Sage Creek Basin. Weekly point count surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location.
4. Winter 2011/2012 (November 16, 2011–March 30, 2012) – A final APP/ECP will be delivered to the agencies for review. The final APP/ECP will identify the avoidance, minimization, and mitigation measures to reduce threats to eagles and other avian species. The radar system will be deployed in a suitable location to ensure weekly maintenance is possible during winter months. Weekly bird observations will be recorded during routine maintenance activities at the radar location. Weather permitting, monthly counts will be conducted at the point count locations in Figure 1.
5. Spring 2012 – PCW and the agencies will initiate the adaptive management process identified and approved in the final APP to incorporate site-specific mitigation and avoidance measures into final project designs and the Final Environmental Impact Statement and Record of Decision. A final report documenting the results of the radar and point count efforts will be provided at least two weeks prior to the initiation of the adaptive management process to ensure adequate review time prior to discussions.



## LITERATURE CITED

Detmers, R., D.A. Buehler, J.G. Bartlett, and N.A. Klaus. 1999. Influence of point count length and repeated visits on habitat model performance. *Journal of Wildlife Management* 63:815-823.

Gerrodette, T. 1987. A power analysis for detecting trends. *Ecology* 68:1364–1372.

Hester, S.G. and M.B. Grenier. 2005. A conservation plan for bats in Wyoming. Wyoming Game and Fish Department, Nongame Program, Lander, WY.

Johnson, G., T. Rintz, M.D. Strickland, and K. Bay. 2008. Baseline avian use studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: final summer and fall interim report, June 26-October 14, 2008. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. *Condor* 82:309-313.

Solick, D., Johnson, G., T. Rintz, and M.D. Strickland. 2008. Bat surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

U.S. Fish and Wildlife Service [USFWS]. 2010. Recommendations on developing effective measures to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities. Submitted to the Secretary of the Interior by the Wind Turbine Guidelines Advisory Committee.

USFWS. 2011a. Draft Land-Based Wind Energy Guidelines, Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats

USFWS. 2011b. Draft eagle conservation plan guidance. January 2011.

Wyoming Game and Fish Department [WGFD]. 2010. Wildlife protection recommendations for wind development in Wyoming. Commission approved version (4-23-2010). 70pp.

This page intentionally left blank

**2012 – 2013 800-meter Raptor Survey Protocols**  
**Chokecherry and Sierra Madre Wind Energy Project**

Prepared for:

**Power Company of Wyoming, LLC**  
**555 17th Street, Suite 2400**  
**Denver, CO 80202**

Prepared by:

**SWCA Environmental Consultants**  
**295 Interlocken Blvd., Suite 300**  
**Broomfield, CO 80021**  
**(303) 487-1183 / Fax (303) 487-1245**

**August 31, 2012**

This page intentionally left blank



## **Introduction**

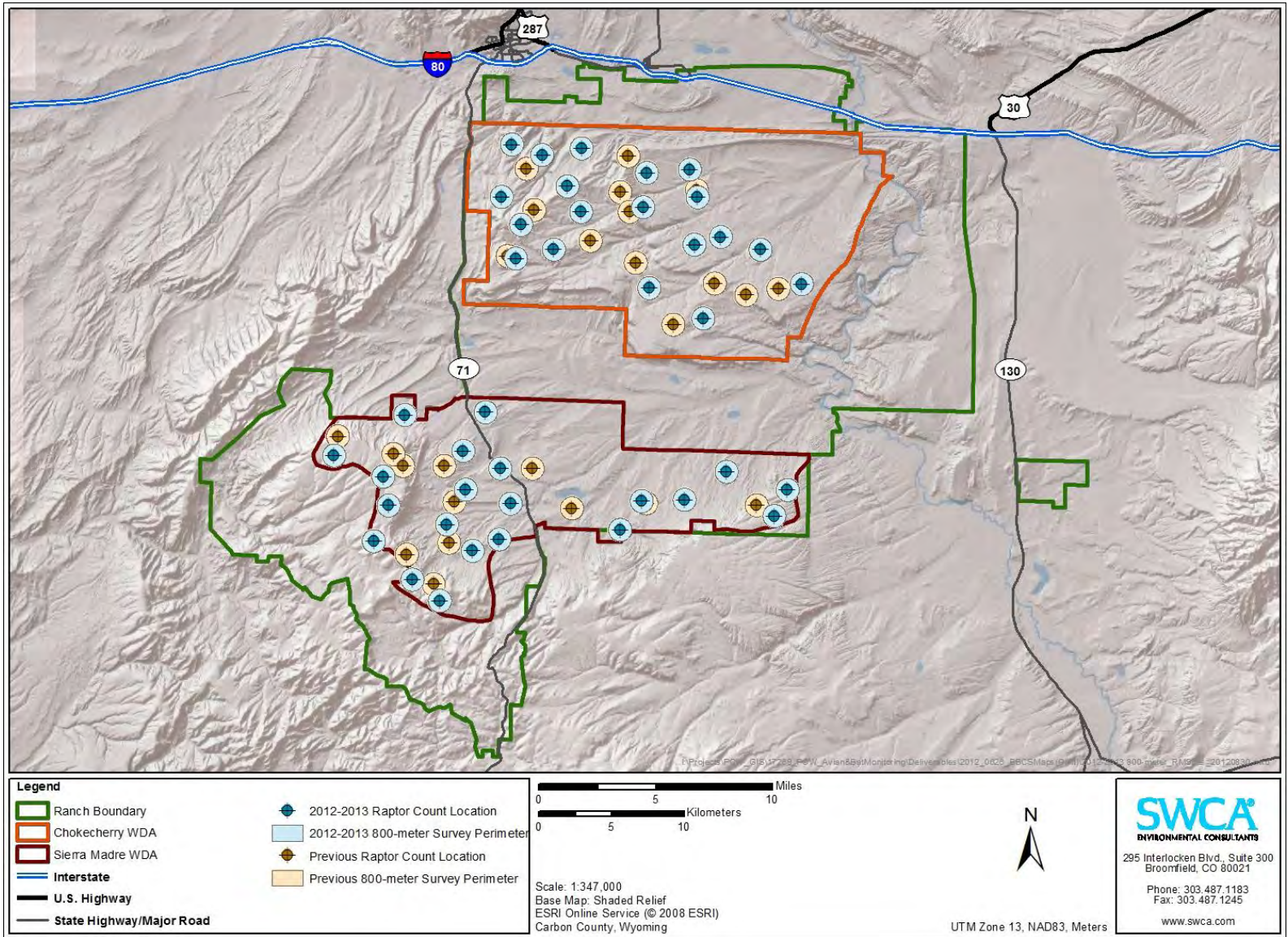
The Power Company of Wyoming LLC (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at the Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. These survey methodology revisions are fully compliant with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project site.

Year Two and Year Three 4,000-meter-radius long-watch raptor surveys were fully compliant with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas in order to minimize avian impacts. Additionally, 4,000-meter data were instructive in showing the Project site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle-use areas as recommended by the Service's Technical Appendices (Service 2012b).

Because the Service's model requires data from 800-meter point count survey efforts, the 4,000-meter data were truncated to include only those observations that occurred within 800 meters (Figure 1). However, due to the 4,000-meter raptor count locations being placed on promenades, ridgelines, and in areas where there was an expectation of high raptor use, estimates of use, and therefore risk calculations that were developed for use across the entire Project site, were overstated due to many of these data being collected in identified high-use areas. Because use estimates were being driven upwards for the Project by many of the data being collected in high-use areas, unrealistic projections of eagle risk were being generated by the Service's model. This in part facilitated the revision to survey protocols.

## **800-meter Raptor Survey Protocols**

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.



**Figure 1. All 800-meter raptor count locations and survey perimeters on the Project site.**

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 40, 800-meter raptor count locations throughout areas of the Project site where turbine development was likely (Figure 1). Locations were selected using a spatially balanced random selection process with the number of 800-meter raptor count locations per area determined by the relative turbine density in the different areas of the Project. Raptor count locations were selected such that no overlap occurs between survey locations or with the avoidance areas that PCW has committed to as part of the Project Eagle Conservation Plan (ECP). Once the initial 800-meter raptor count locations were selected, some minimal micro-siting of the locations was conducted to ensure full visibility of the survey areas and safe and consistent accessibility on the part of field personnel. Coordinates for each of the final 800-meter raptor survey locations are listed in Table 1. Landmarks and lathe stakes were located within each survey location perimeter to provide distance references for field personnel completing survey efforts. When the 800-meter radius survey areas of the new 40 point count locations are combined with the 800-meter radius survey areas of the Year Two and Year Three sites, 34.7% of the probable development areas are covered by raptor count surveys, which is greater than the 30% recommendation made by the Service (Service 2012b).

**Table 1. Names and Coordinates for 2012 – 2013 800-meter Raptor Count Locations.**

<b>Location</b>	<b>Easting</b>	<b>Northing</b>
CB1	326414	4597515
CB2	321985	4595451
CB3	323462	4597428
CB4	329306	4599449
CC1	316611	4621251
CC2	315166	4616447
CC3	318351	4619090
CC4	314539	4621971
CC5	317418	4614741
CC6	319335	4621702
CC7	313825	4618366
CC8	314807	4614119
CC9	319294	4617332
CMD1	334482	4612363
CMD2	331648	4614732
HB1	323818	4620014
HB2	326781	4620243
MH1	302291	4600564
MH2	305677	4599125
MH3	307684	4592030

<b>Location</b>	<b>Easting</b>	<b>Northing</b>
MH4	305024	4594675
MH5	309573	4590571
MH6	306043	4597131
PG1	313663	4594801
PG2	311358	4598224
PG3	307172	4603361
PG4	314434	4597259
PG5	313730	4599682
PG6	312721	4603547
PG7	310058	4595825
PG8	311832	4594006
PG9	311187	4600886
SCR1	333505	4598194
SCR2	332597	4596408
SR1	323560	4617658
SR2	327318	4618336
UH1	328912	4615606
UH2	327099	4615081
UI1	323987	4612091
UI2	327702	4610001

Surveys will be conducted at each raptor count location for two hours per guidance in the Technical Appendices (Service 2012b). Two avian technicians will each survey two locations a day for a total of 20 locations per week. Each location will be surveyed bi-weekly. A schedule for all 40 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 40 sites. The schedule was also designed such that the four

raptor count surveys conducted on any given day are separated temporally and spatially to provide independence of any observations that are made.

Avian technicians are equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of lathe stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 1). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, and hourly weather data (Attachment 2).

At present, the 800-meter raptor counts are scheduled to continue bi-weekly at each location through the fall migration period (November 15). Surveys are tentatively slated to occur once per month at each location during the winter season (December 2012 through March 2013) due to accessibility and safety concerns. The end of winter surveys in March 2013 will complete three full years of data collection for the Project. Consultations are ongoing with Service personnel to determine the scope of potential survey efforts beyond March 2013.

## **References**

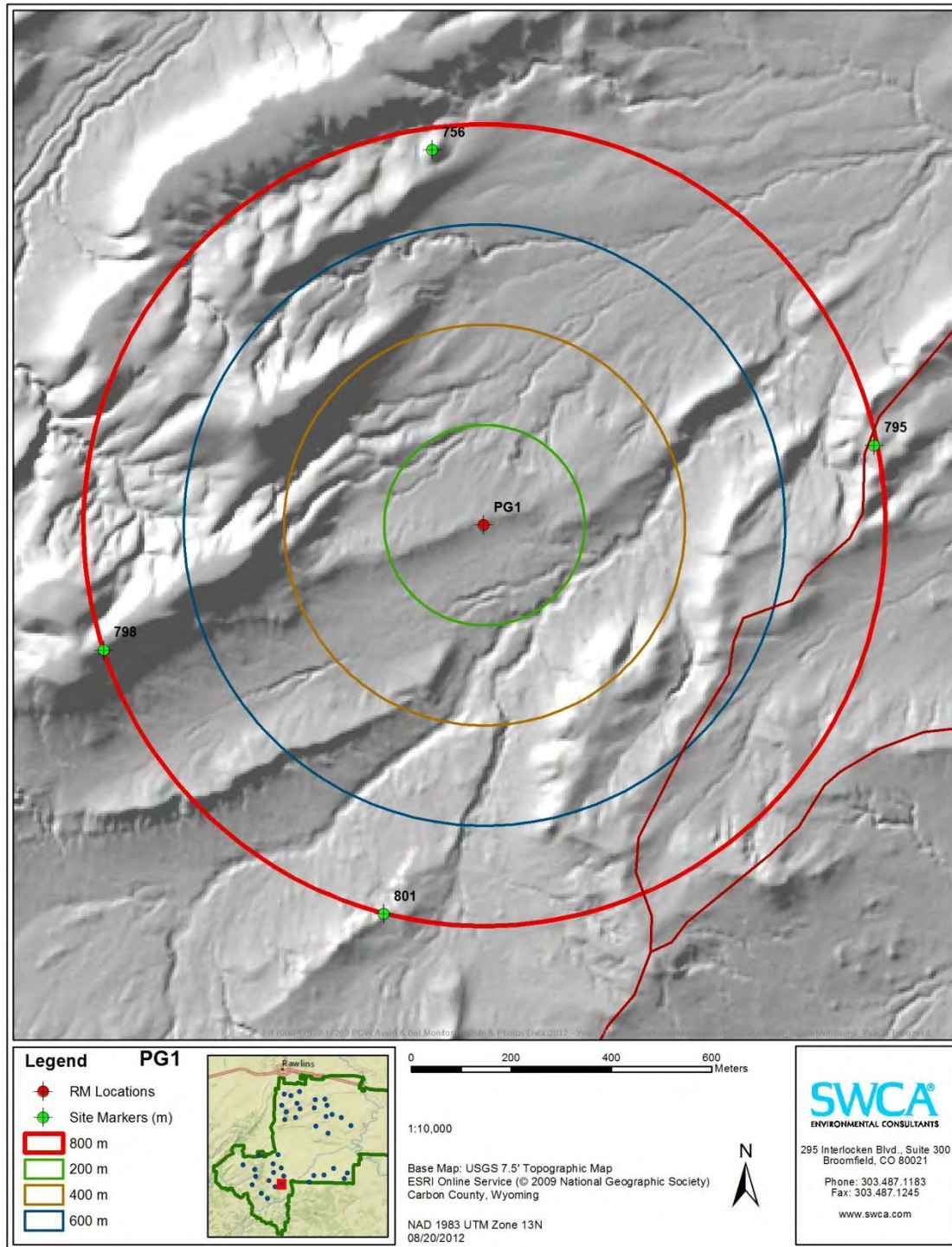
- Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.
- U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at <http://www.fws.gov/windenergy/>. Accessed December 2011.
- . 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at [http://www.fws.gov/windenergy/docs/WEG\\_final.pdf](http://www.fws.gov/windenergy/docs/WEG_final.pdf). Accessed August 2012.
- . 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.
- Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.



## **ATTACHMENT 1**

### **Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys**

This page intentionally left blank



Aerial map example.

This page intentionally left blank



## **ATTACHMENT 2**

### **Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys**

This page intentionally left blank

## PCW 2011 Raptor Survey

Field  
Observer: \_\_\_\_\_

**Survey Location:** \_\_\_\_\_

**Start time:** \_\_\_\_\_

End time: \_\_\_\_\_

**Date:** \_\_\_\_\_

Page: \_\_\_\_ of \_\_\_\_

[illegible]

# PCW 2011 Raptor Survey Notes

Field Observer: \_\_\_\_\_

Survey Pt: \_\_\_\_\_

Date: \_\_\_\_\_

Page: \_\_\_\_\_ of \_\_\_\_\_

Other species and Notes:

Weather Conditions				
Time	Sky	Wind		Temp (°F)
		Dir	Spd	

Incidental Species Observations



**Revised 2012-2013 800-meter Raptor Survey Protocols  
Chokecherry and Sierra Madre Wind Energy Project**

Prepared for:

**Power Company of Wyoming, LLC  
555 17th Street, Suite 2400  
Denver, CO 80202**

Prepared by:

**SWCA Environmental Consultants  
295 Interlocken Blvd., Suite 300  
Broomfield, CO 80021  
(303) 487-1183 / Fax (303) 487-1245**

**November 2012**

This page intentionally left blank

The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

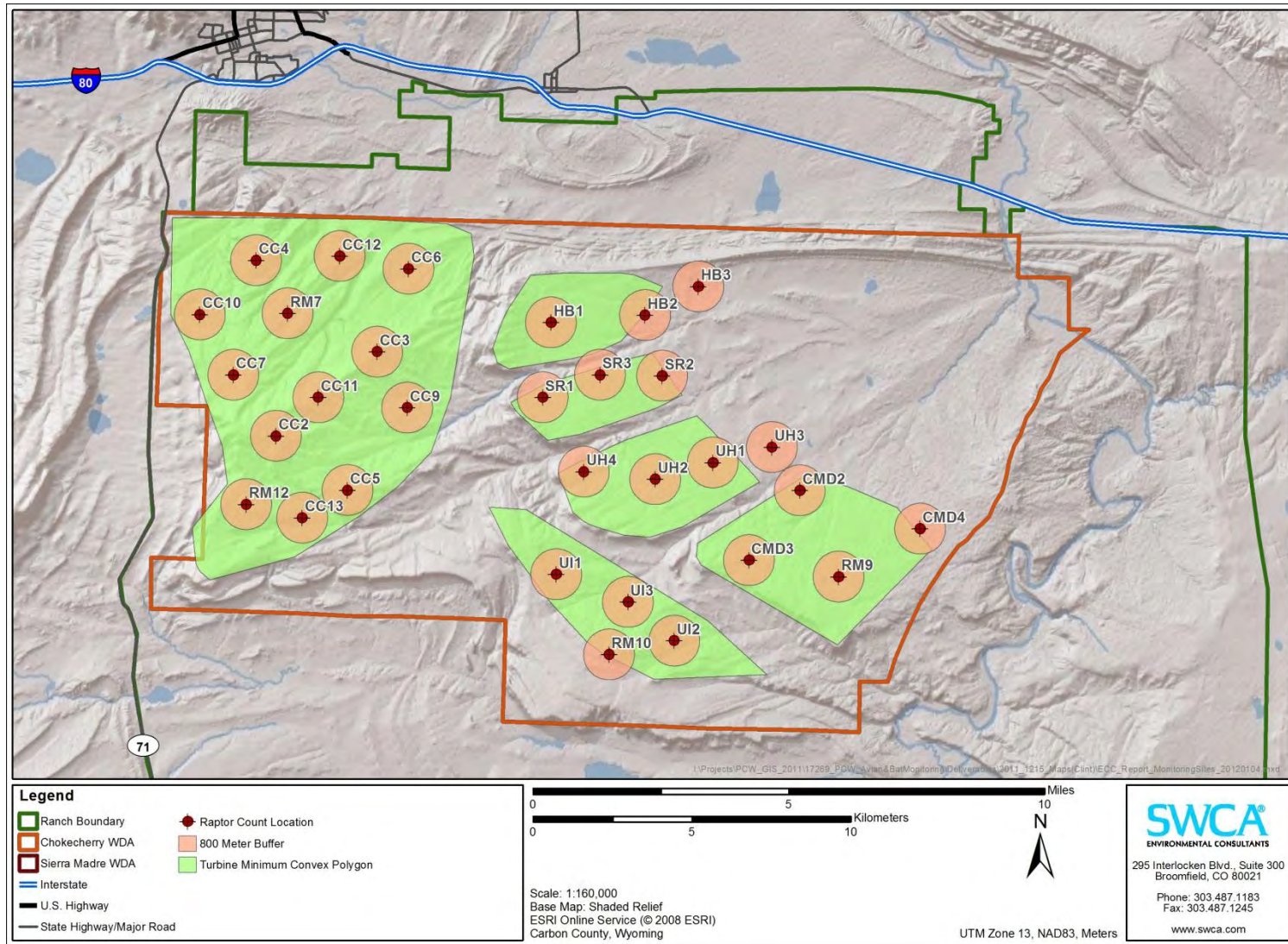
accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

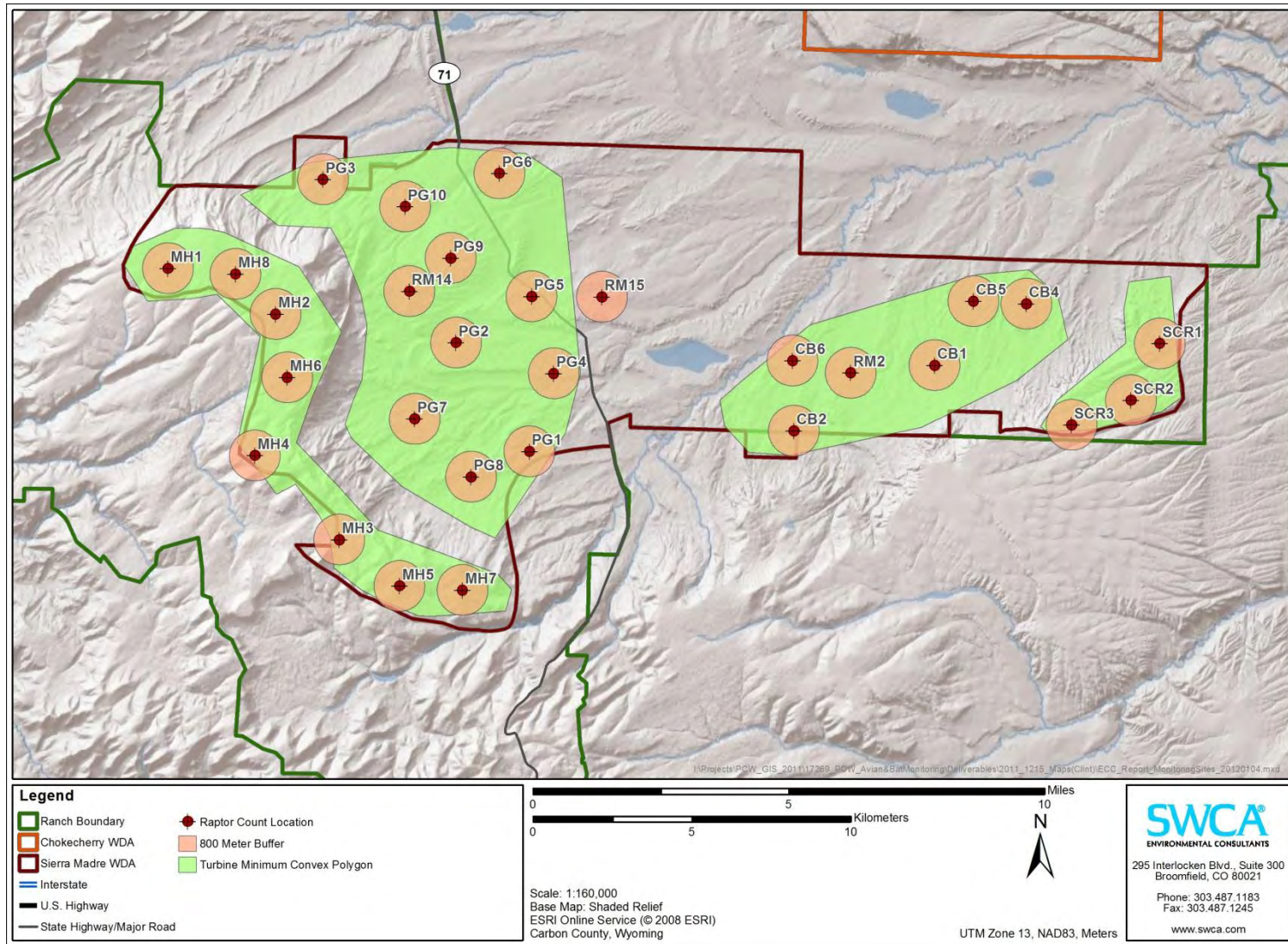
The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micro-siting of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.





**Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.**





**Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.**

**Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.**

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
		CC3	Original Fall 2012 Site	318351	4619090
		CC4	Original Fall 2012 Site	314539	4621971
		CC5	Original Fall 2012 Site	317418	4614741
		CC6	Original Fall 2012 Site	319335	4621702
		CC7	Original Fall 2012 Site	313825	4618366
		CC9	Original Fall 2012 Site	319294	4617332
		CC10	New 2012 Survey Site	312770	4620262
		CC11	New 2012 Survey Site	316501	4617656
		CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
		CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
		RM7	2011-2012 Long-watch Site	315531	4620298
		RM12	2011-2012 Long-watch Site	314228	4614294
	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
		CMD3	New 2012 Survey Site	330049	4612535
		CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
		RM9	2011-2012 Long-watch Site	332870	4612018
	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
		HB2	Original Fall 2012 Site	326781	4620243
		HB3	New 2012 Survey Site	328457	4621145
	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
		SR2	Original Fall 2012 Site	327318	4618336
		SR3	New 2012 Survey Site	325362	4618367
	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
		UH2	Original Fall 2012 Site	327099	4615081
		UH3	New 2012 Survey Site	330772	4616091
		UH4	New 2012 Survey Site	324853	4615321
	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
		UI2	Original Fall 2012 Site	327702	4610001
		UI3	New 2012 Survey Site	326242	4611221
		RM10	2011-2012 Long-watch Site	325646	4609568

\*UTM Zone 13, NAD83, Meters

**Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.**

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

\*UTM Zone 13, NAD83, Meters



Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

## REFERENCES

- Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.
- U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at <http://www.fws.gov/windenergy/>. Accessed December 2011.
- . 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at [http://www.fws.gov/windenergy/docs/WEG\\_final.pdf](http://www.fws.gov/windenergy/docs/WEG_final.pdf). Accessed August 2012.
- . 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.
- Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

**ATTACHMENT 1**  
**Response to Survey Recommendations Made in the Service's**  
**September 28, 2012 Letter**

This page intentionally left blank



The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

*example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.*

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a “minimal spatial coverage of at least 30% of the project footprint” (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 18). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.



10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was “fully compliant” with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term “consistent with” rather than “compliant with” when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

Response: The recommended changes have been made. The term “compliant” has been changed to “consistent”. As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about “unrealistic projections” concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

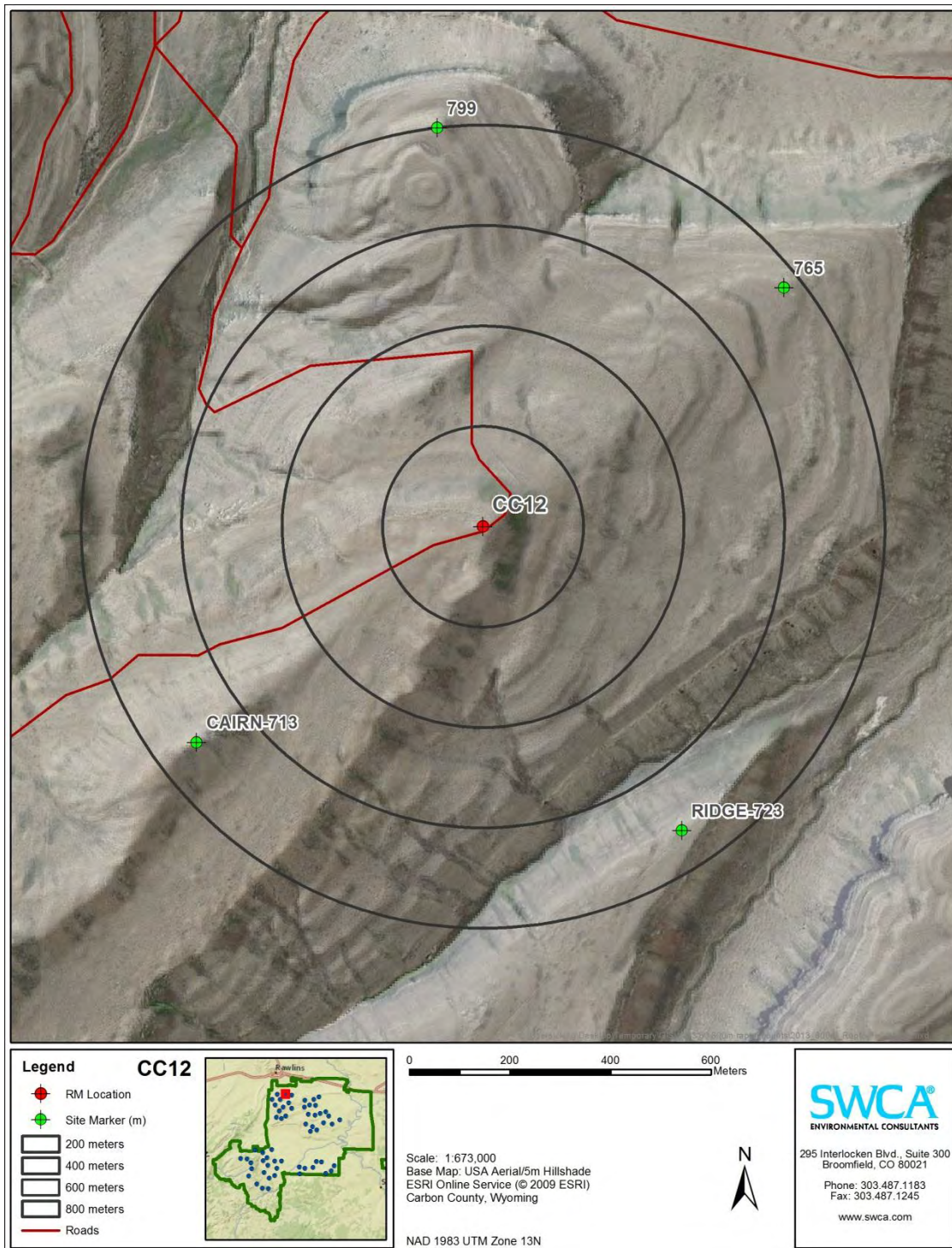
Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

## **ATTACHMENT 2**

### **Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys**



This page intentionally left blank



**Aerial map example.** Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

**ATTACHMENT 3**  
**Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys**

This page intentionally left blank



## PCW 2012-2013 Raptor Survey

Field  
Observer: \_\_\_\_\_

**Survey Location:** \_\_\_\_\_

**Start time:** \_\_\_\_\_

End time: \_\_\_\_\_

Date: \_\_\_\_\_

Page: \_\_\_\_ of \_\_\_\_

[illegible]

PCW 2012-2013 Raptor Survey Notes

Field Observer: \_\_\_\_\_

Survey Pt: \_\_\_\_\_

Date: \_\_\_\_\_

Page: \_\_\_\_\_ of \_\_\_\_\_

Other species and Notes.

Weather Conditions				
		Wind		Temp (°F)
Time	Sky	Dir	Spd	

Incidental Species Observations  
for eagles and raptors note distance and bearing